MOTOROLA

Personal Communications Sector

GSM Service Support Level 1&2 Authorized

T189

GSM Service Support

Training - Documentation - Engineering

Level 1 and 2 Service Manual V1.0

CONTENTS

Page Number

SECTION 1: GENERAL
1.1 Introduction
1.2 Motorola service policy for T189 in warranty
1.3 General Safety Information

SECTION 2: T189 DESCRIPTION
2.1 Specifications of T189
2.2 T189 Overview
2.3 Connector Pinout
2.4 Talk time, Weight and Volume Matrix

SECTION 3: FEATURE LIST
3.1 List of Features available
3.2 Phone Book
3.3 Call Related Features
3.4 Messages
3.5 Phone Set Up
3.6 Network selection
3.7 Call Meters
3.9 Accesory Set up

SECTION 4: DISASSEMBLY & PARTS
4.1 Dissasembly Introduction
4.2 Recommended Tools
4.3 Disassembly Procedure
4.4 Assembly procedure
4.5 Exploded Parts diagram
4.6 Replacement parts

SECTION 5: SIM CARDS AND SECURITY
5.1 Manual test mode
5.2 Live Sim Card
5.3 Personality Transfer
5.4 GSM Test Command
5.5 Identity and Security

SECTION 6: REPAIR & TEST PROCEDURES
6.1 Repair introduction
6.2 Mechanical repairs
6.3 Basic modular troubleshooting
6.4 Repair Chart
6.5 Software Upgrade
6.6 Flexing
6.7 Testing on HP8922

SECTION 7: ACCESSORIES

SECTION 8: SALES MODELS

SECTION 9: GLOSSARY OF TERMS
9.1 List of Abbreviations

2.1 Specifications of T189

General

Function	**Specification**
Frequency Range GSM Frequency Range DCS	880-915 MHz TX (with EGSM) 925-960 MHz RX (with EGSM) 1710-1785 MHz Tx 1805-1880 MHz Rx
Channel Spacing	200 kHz
Channels	174 GSM/374 DCS carriers with 8 channels per carrier
Modulation	GMSK at BT = 0.3
Transmitter Phase Accuracy	5 Degrees RMS, 20 Degrees peak
Duplex Spacing	45 MHz GSM / 95MHz DCS
Frequency Stability	+ 0.10 ppm of the downlink frequency (Rx)
Operating Voltage	Mid RateCharger: = 5.9V, +/-0.3V Battery Operating Voltage: 2.85V(Radio Shut Down voltage) To 4.2V Max)
Transmit Current	Typically 290 mA avg,
Stand-by Current	Typically 10 mA
Dimensions	108mmx43mmx23.5mm (Leap Slim Battery)
Size (Volume)	85cc
Weight	95g with Battery
Temperature Range	-10C to +55C

Transmitter

Function	***Specification***
RF Power Output	33 dBm + 2dB GSM/ 30 dBm + 2 dB DCS
Output Impedance	50 ohms (nominal)
Spurious Emissions	-36 dBm from 0.1 to 1 Ghz -30 dBm from 1 to 4 Ghz

Receiver

Function	***Specification***
RF Level	-102 dBm GSM / -100 dBm DCS
RX bit error rate (100 k bits)	< 2%
Channel Hop Time	500 microseconds
Time to Camp	Approximately 5-10 seconds

Speech Coding

Function	***Specification***
Speech Coding Type	Regular Pulse Excitation / Linear Predictive Coding with Long Term Prediction. (RPE LPC with LTP).
Bit Rate	13.0 k bps

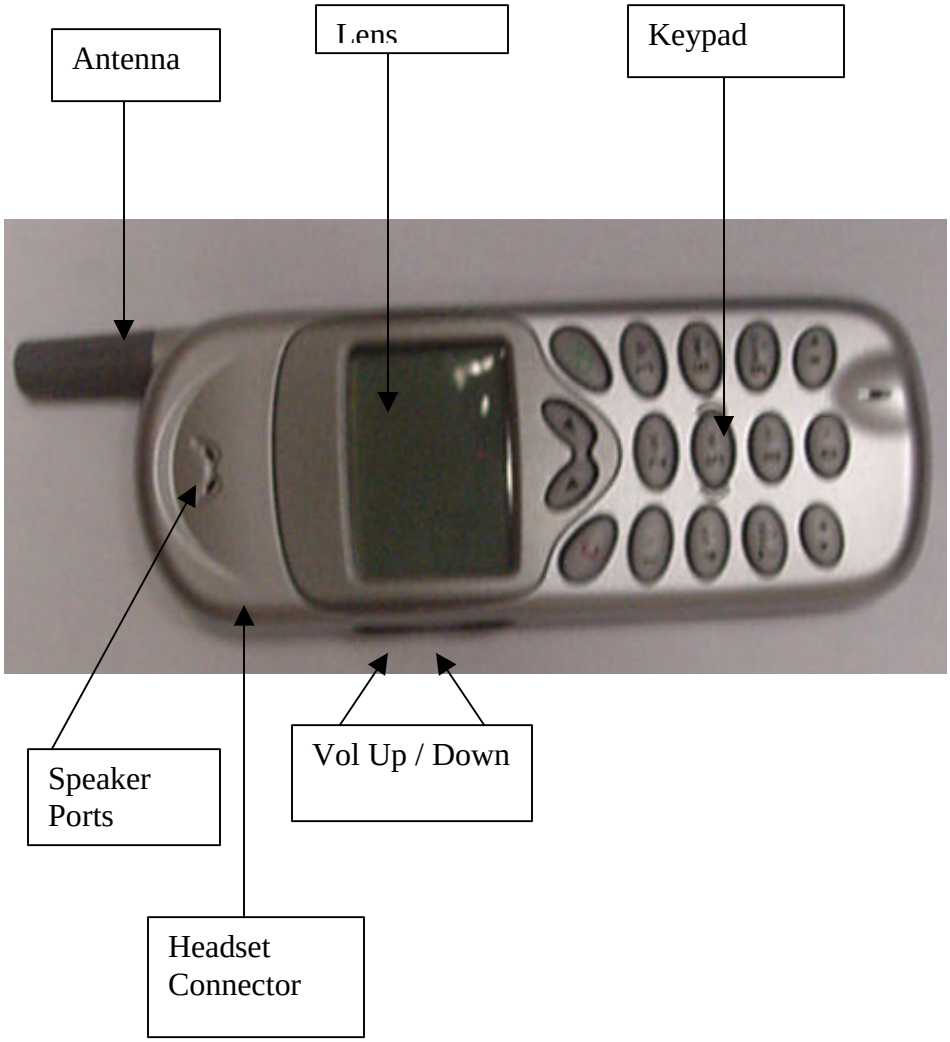
Frame Duration	20 ms
Block Length	260 bits
Classes	Class 1 bits = 182 bits. Class 2 bits = 78 bits
Bit Rate with FEC Encoding	22.8 k bps

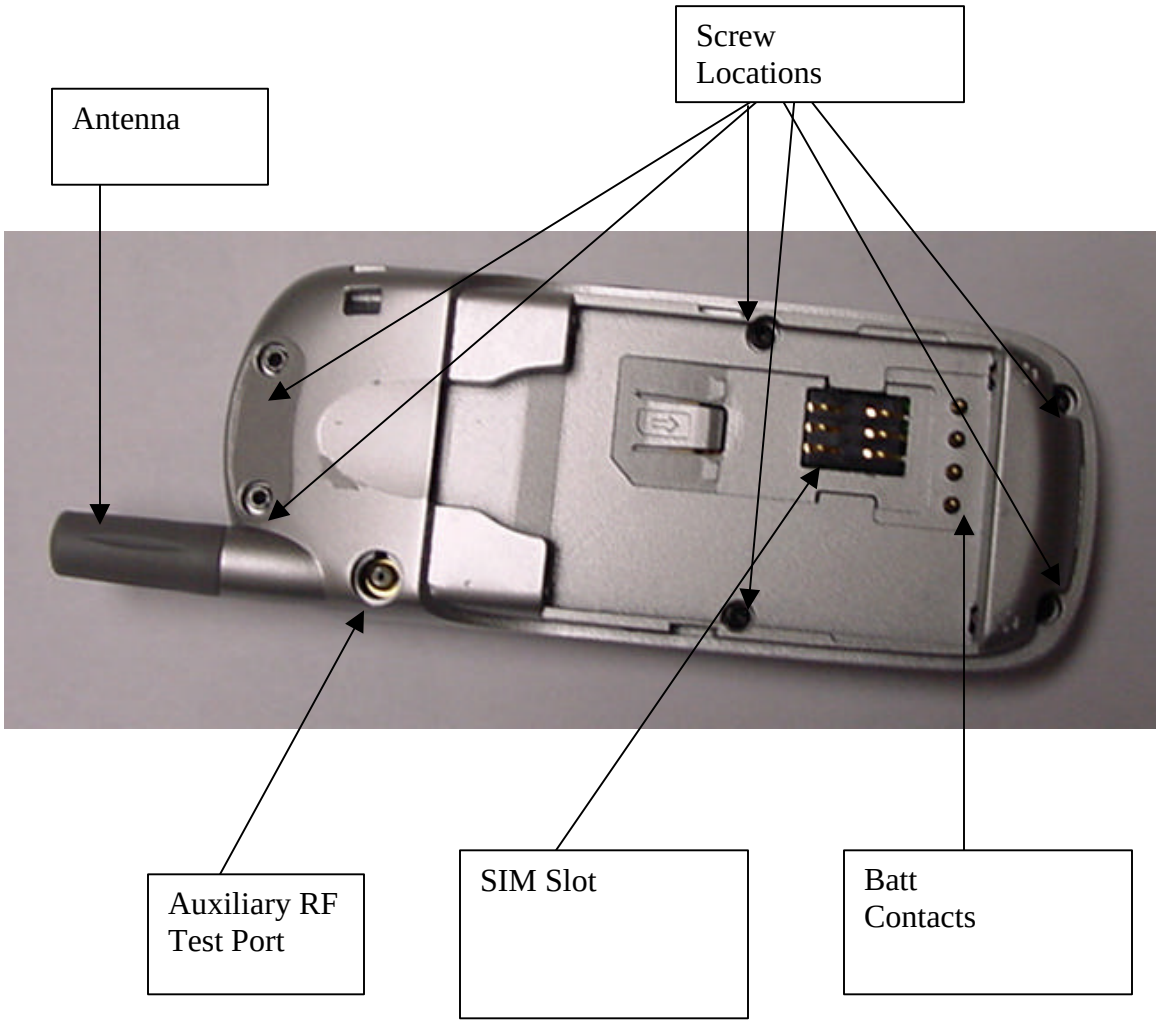
2.2 T189 Overview

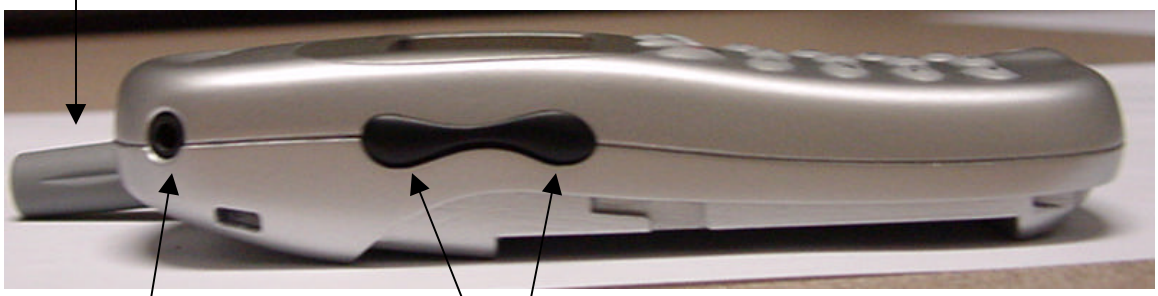
The T189 will incorporate many new features that were, in the past unavailable to the low cost products. These are:

.Alarm
RTC
Vibrator
Intergrated Headset
96 X 64 Graphics Display with 13 Soft Icons
Single Lion Batteries 580mA
Dual Band GSM 900 and GSM 1800
SIM toolkit V2.2.0

Fig 2.1 Mechanical pictorial Overview




Screw Locations
Antenna
Auxiliary RF Test Port
SIM Slot
Batt Contacts

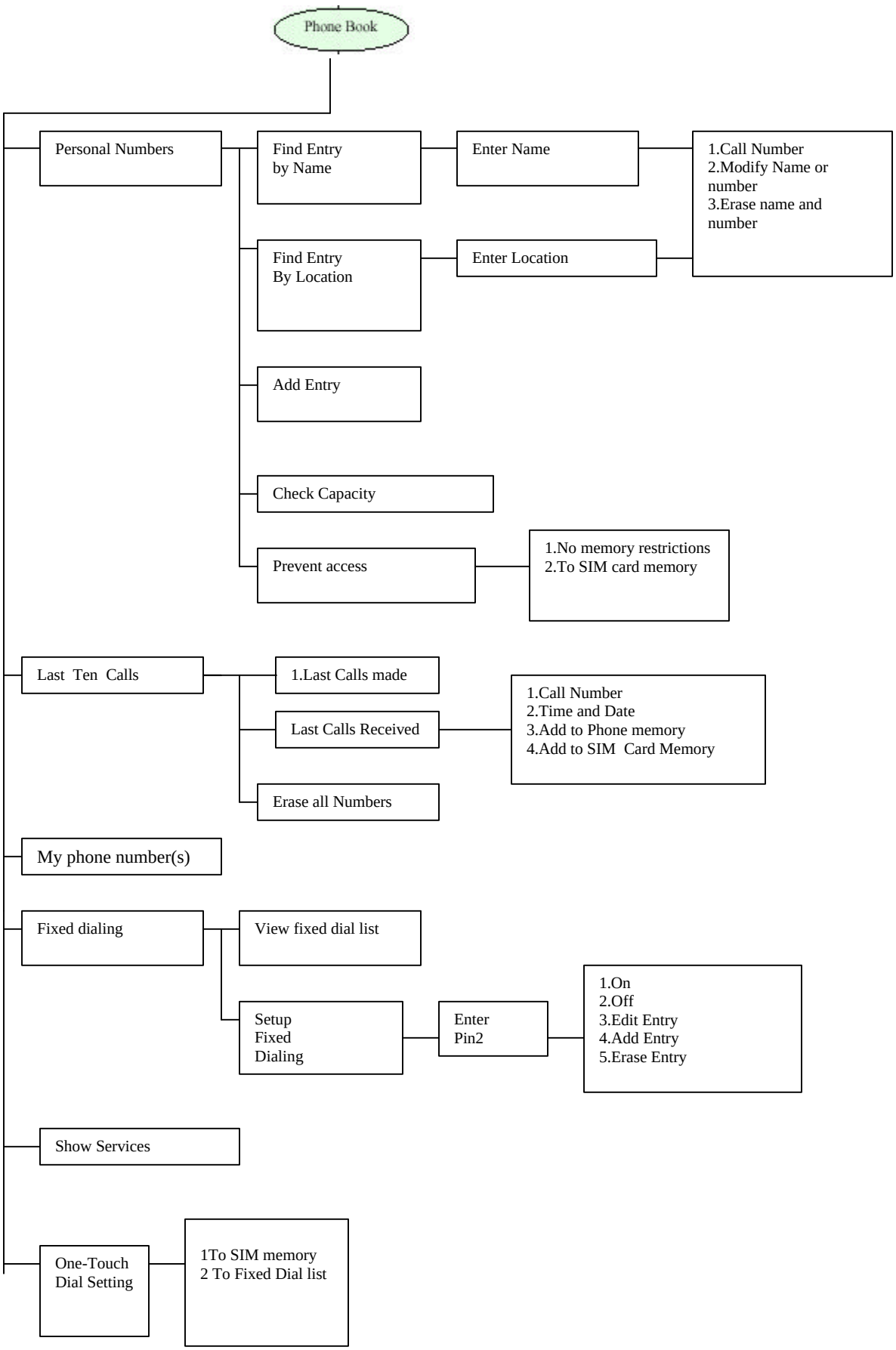

Antenna
Headset Adapter
Volume Buttons
Battery Cover
Antenna

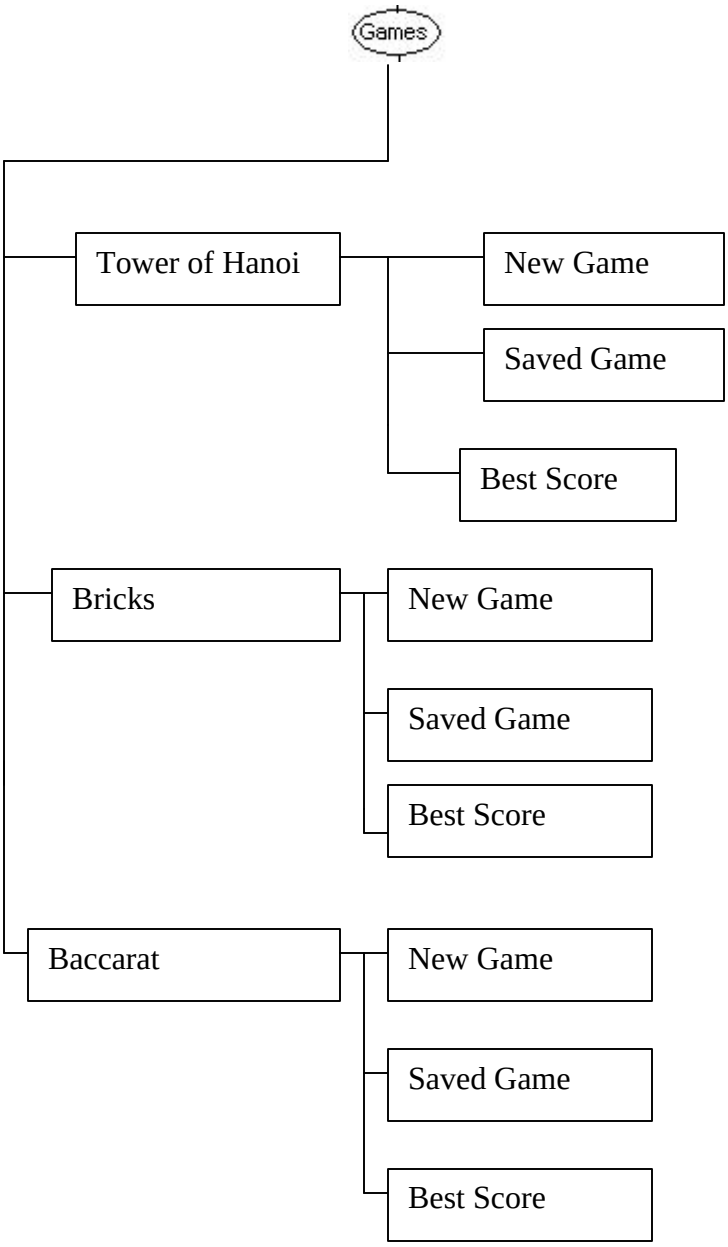
2.3 Connector Pinout

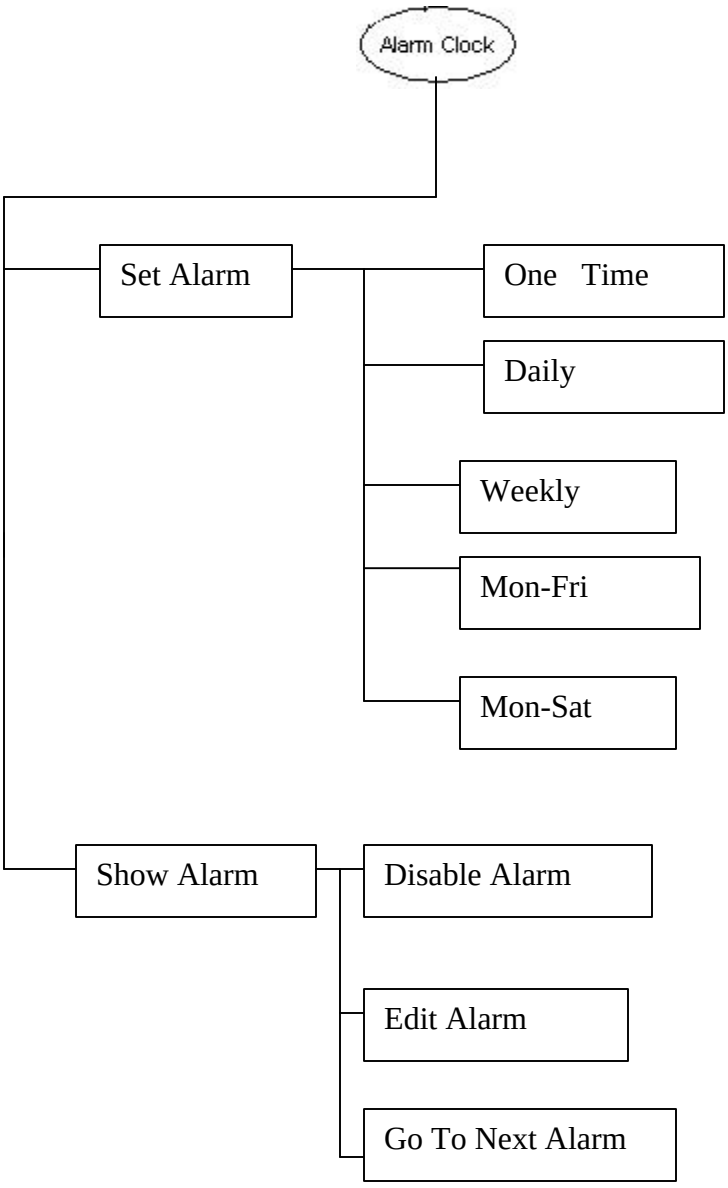
2.4 Talk Times, Weight, Dimensions and Volume Matrix

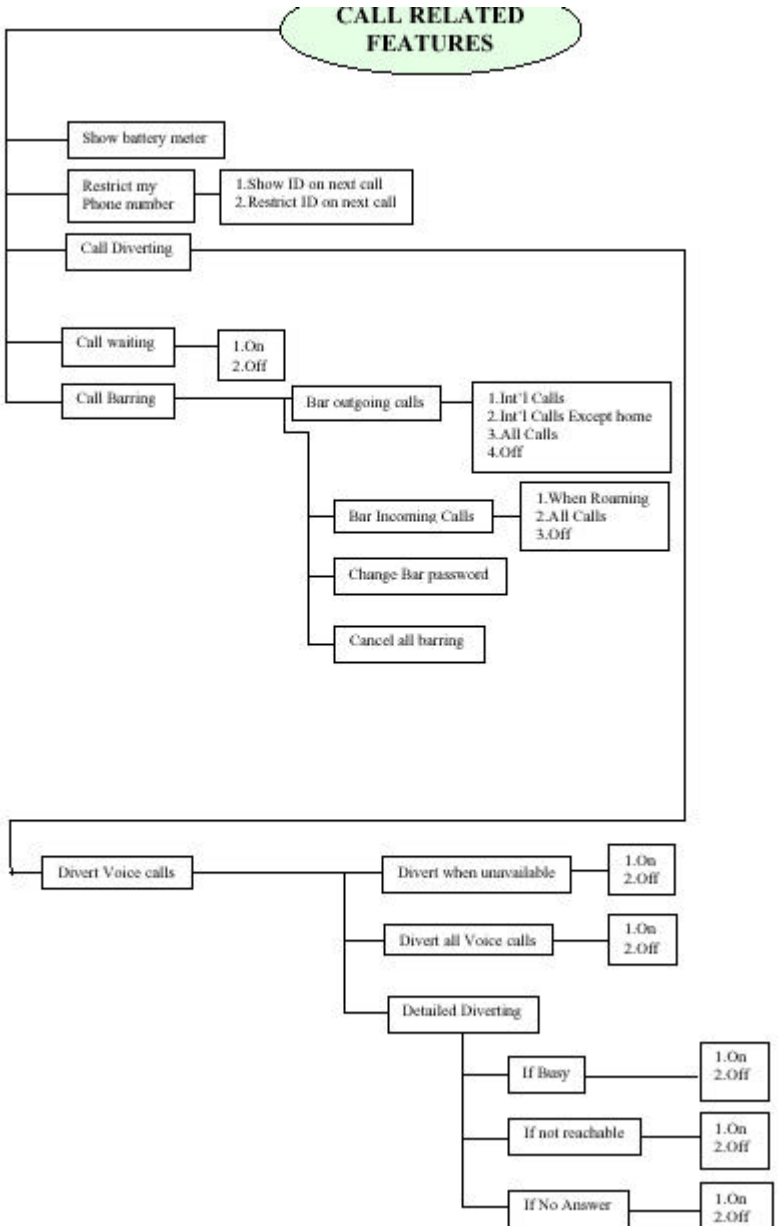
Volume (cubic cm))	**Weight (grams)**	**Talk Time (minutes)**	**Standby time (hours)**	**Dimensions (mm)**	**With Battery type:**
85	95g	>=150-210	100-200	108mmx43mmx23.5mm (Leap Slim Battery	580mAh Lion Battery

SECTION 3: FEATURE LIST

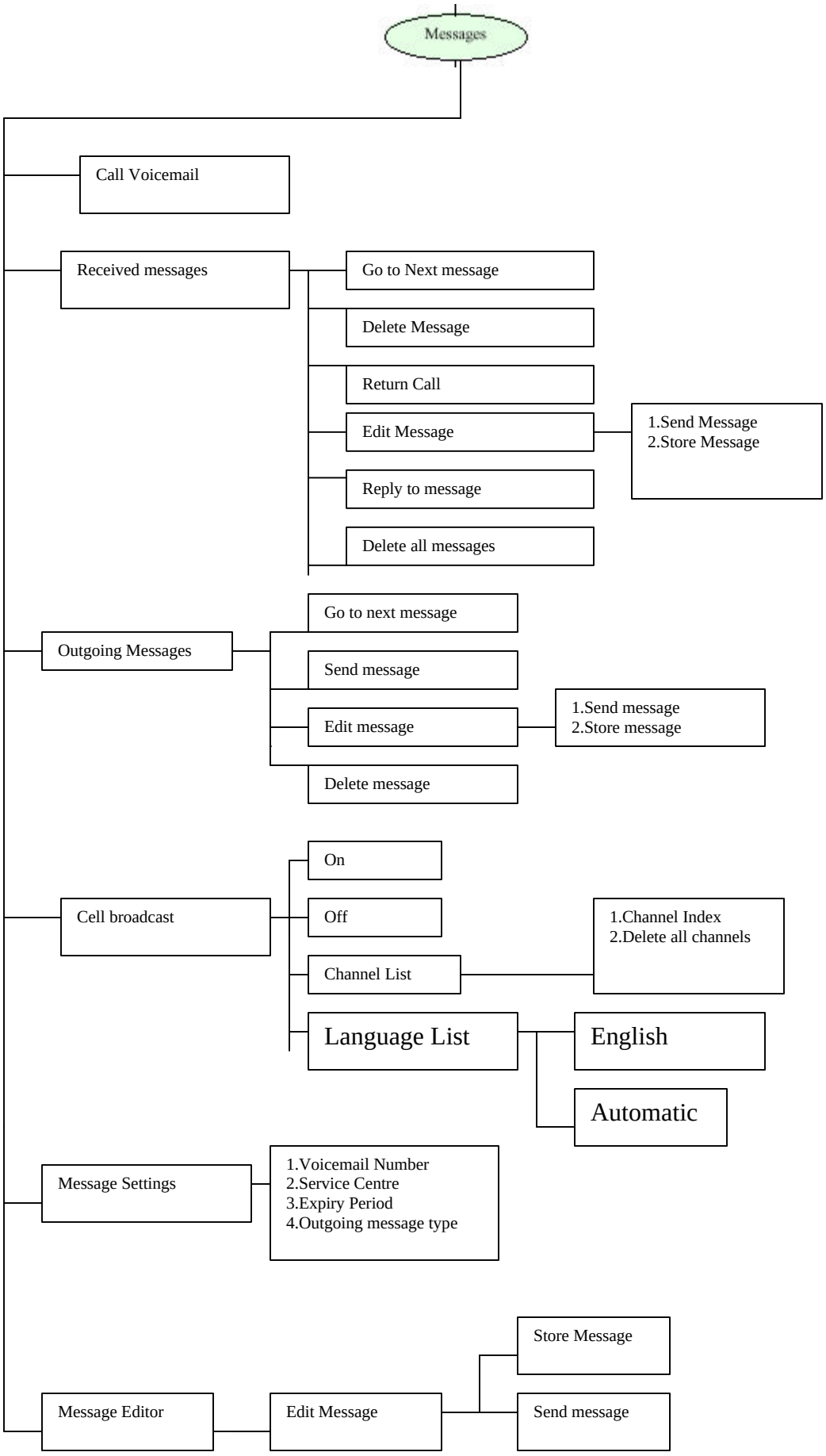

Phone Book
Personal Numbers
Find Entry by Name
Enter Name
1.Call Number
2.Modify Name or number
3.Erase name and number
Find Entry By Location
Enter Location
Add Entry
Check Capacity
Prevent access
1.No memory restrictions
2.To SIM card memory
Last Ten Calls
1.Last Calls made
Last Calls Received
1.Call Number
2.Time and Date
3.Add to Phone memory
4.Add to SIM Card Memory
Erase all Numbers
My phone number(s)
Fixed dialing
View fixed dial list
Setup Fixed Dialing
Enter Pin2
1.On
2.Off
3.Edit Entry
4.Add Entry
5.Erase Entry
Show Services
One-Touch Dial Setting
1To SIM memory
2 To Fixed Dial list

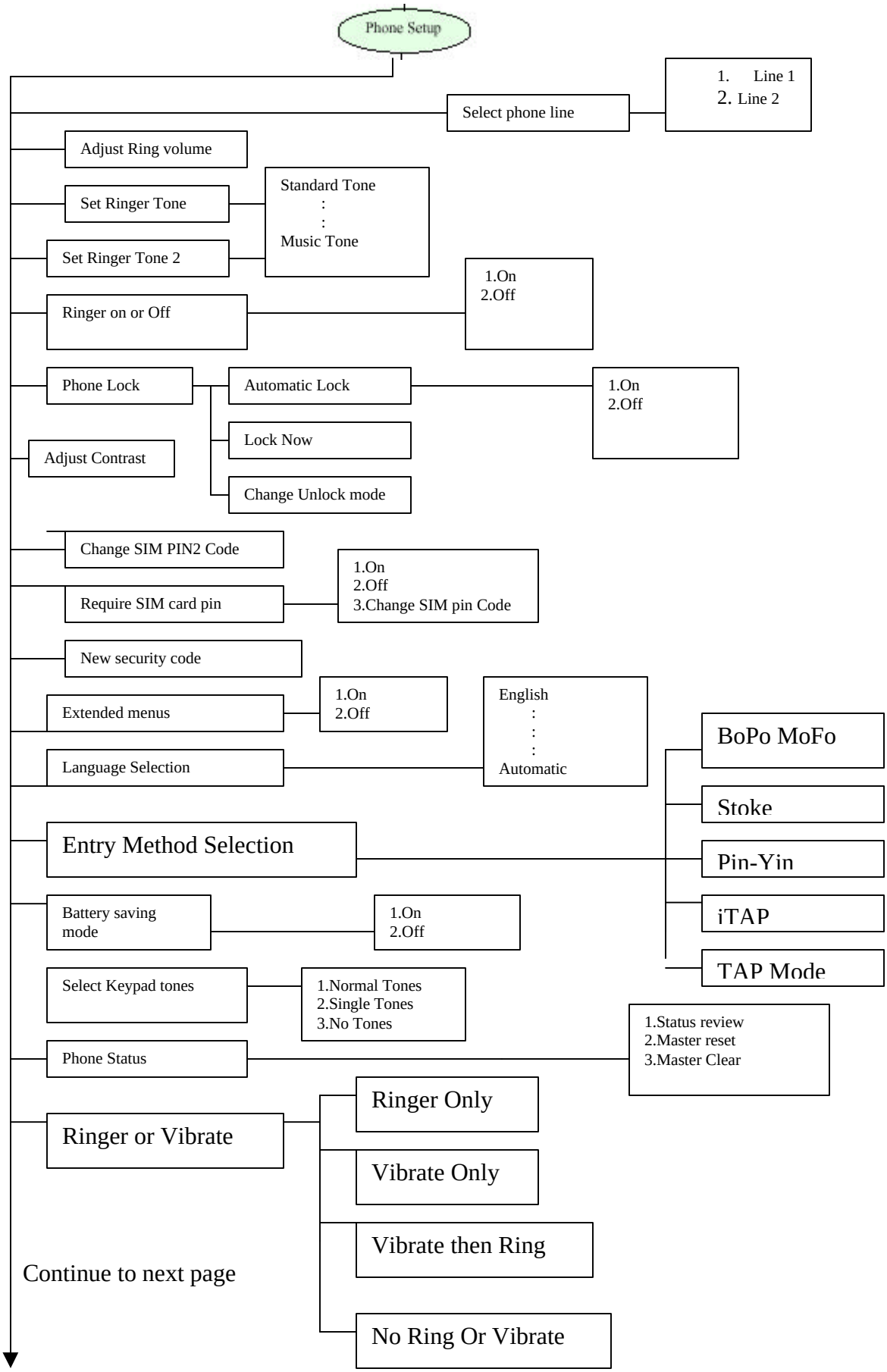

Games
Tower of Hanoi
New Game
Saved Game
Best Score
Bricks
New Game
Saved Game
Best Score
Baccarat
New Game
Saved Game
Best Score

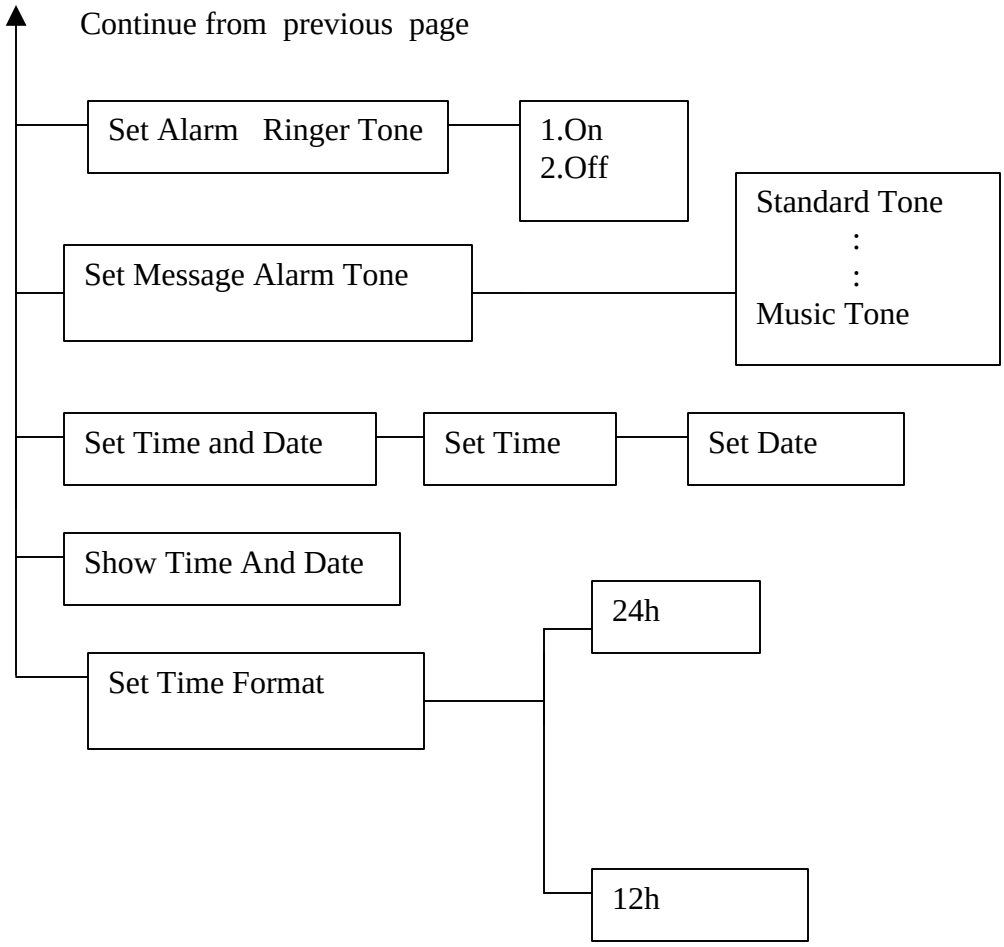

Alarm Clock
Set Alarm
One Time
Daily
Weekly
Mon-Fri
Mon-Sat
Show Alarm
Disable Alarm
Edit Alarm
Go To Next Alarm

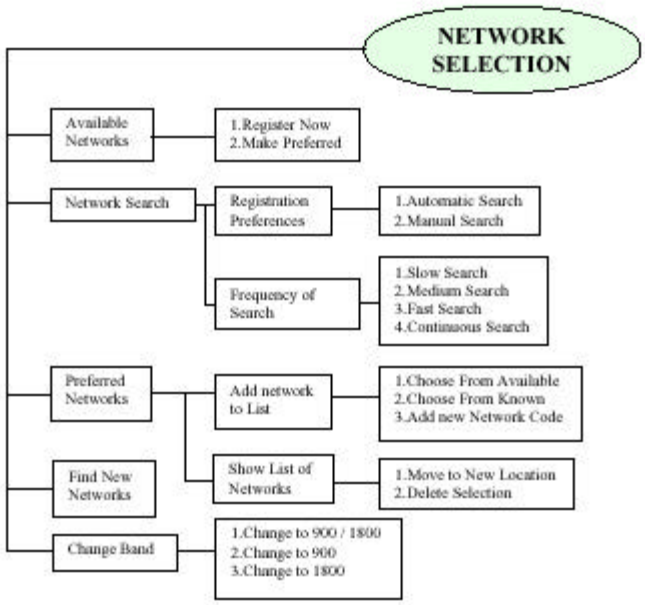

CALL RELATED FEATURES
Show battery meter
Restrict my Phone number
1.Show ID on next call
2.Restrict ID on next call
Call Diverting
Call waiting
1.On
2.Off
Call Barring
Bar outgoing calls
1.Int'l Calls
2.Int'l Calls Except home
3.All Calls
4.Off
Bar Incoming Calls
1.When Roaming
2.All Calls
3.Off
Change Bar password
Cancel all barring
Divert Voice calls
Divert when unavailable
1.On
2.Off
Divert all Voice calls
1.On
2.Off
Detailed Diverting
If Busy
1.On
2.Off
If not reachable
1.On
2.Off
If No Answer
1.On
2.Off

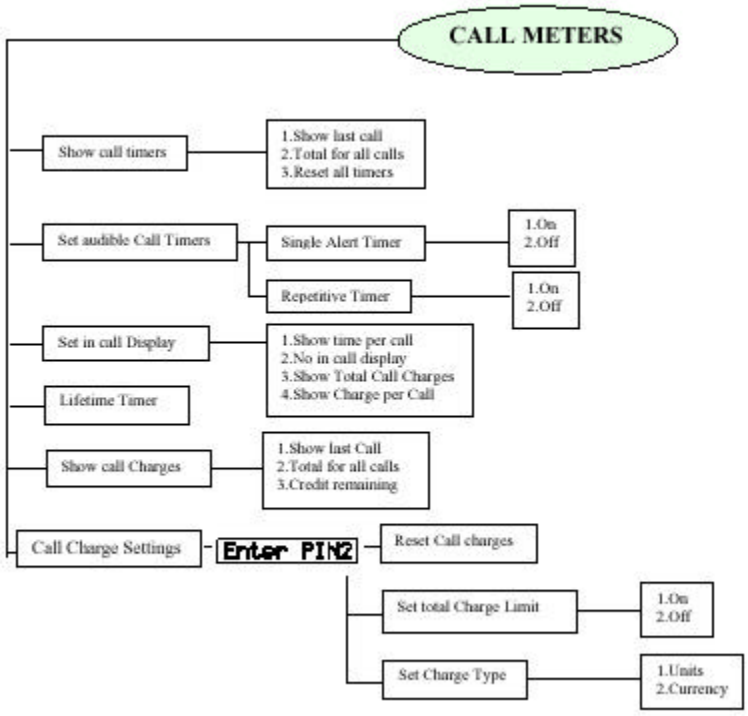
1.


Messages
Call Voicemail
Received messages
Go to Next message
Delete Message
Return Call
Edit Message
1.Send Message
2.Store Message
Reply to message
Delete all messages
Outgoing Messages
Go to next message
Send message
Edit message
1.Send message
2.Store message
Delete message
Cell broadcast
On
Off
Channel List
1.Channel Index
2.Delete all channels
Language List
English
Automatic
Message Settings
1.Voicemail Number
2.Service Centre
3.Expiry Period
4.Outgoing message type
Message Editor
Edit Message
Store Message
Send message

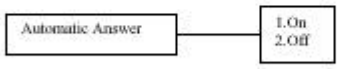

Phone Setup
Select phone line
1. Line 1
2. Line 2
Adjust Ring volume
Set Ringer Tone
Standard Tone
:
:
Music Tone
Set Ringer Tone 2
Ringer on or Off
1.On
2.Off
Phone Lock
Automatic Lock
1.On
2.Off
Lock Now
Change Unlock mode
Adjust Contrast
Change SIM PIN2 Code
Require SIM card pin
1.On
2.Off
3.Change SIM pin Code
New security code
Extended menus
1.On
2.Off
Language Selection
English
:
:
:
Automatic
BoPo MoFo
Stoke
Pin-Yin
iTAP
TAP Mode
Entry Method Selection
Battery saving mode
1.On
2.Off
Select Keypad tones
1.Normal Tones
2.Single Tones
3.No Tones
Phone Status
1.Status review
2.Master reset
3.Master Clear
Ringer or Vibrate
Ringer Only
Vibrate Only
Vibrate then Ring
No Ring Or Vibrate
Continue to next page


Continue from previous page
Set Alarm Ringer Tone
1.On
2.Off
Set Message Alarm Tone
Standard Tone
:
:
Music Tone
Set Time and Date
Set Time
Set Date
Show Time And Date
Set Time Format
24h
12h


NETWORK SELECTION
Available Networks
1.Register Now
2.Make Preferred
Network Search
Registration Preferences
1.Automatic Search
2.Manual Search
Frequency of Search
1.Slow Search
2.Medium Search
3.Fast Search
4.Continuous Search
Preferred Networks
Add network to List
1.Choose From Available
2.Choose From Known
3.Add new Network Code
Find New Networks
Show List of Networks
1.Move to New Location
2.Delete Selection
Change Band
1.Change to 900 / 1800
2.Change to 900
3.Change to 1800


CALL METERS
Show call timers
1.Show last call
2.Total for all calls
3.Reset all timers
Set audible Call Timers
Single Alert Timer
1.On
2.Off
Repetitive Timer
1.On
2.Off
Set in call Display
1.Show time per call
2.No in call display
3.Show Total Call Charges
4.Show Charge per Call
Lifetime Timer
Show call Charges
1.Show last Call
2.Total for all calls
3.Credit remaining
Call Charge Settings
Enter PIN2
Reset Call charges
Set total Charge Limit
1.On
2.Off
Set Charge Type
1.Units
2.Currency

NB. THIS MENU IS ONLY AVAILABLE WITH EITHER HEADSET PLUGGED IN OR WHEN INSTALLED IN A CAR KIT.



SECTION 4: DISASSEMBLY &PARTS

4.1 Disassembly Introduction

The T189 is held together by 6 screws, 2 uppermost and 4 within the battery casing. Ensure care is taken when removing the LCD from the main PCB as the flex is very delicate and can be easily damaged.
Ensure that a properly grounded high impedance conductive wrist strap is used whilst performing any tasks during the disassembly and assembly of the unit

Avoid stressing the plastics in any way to avoid damage to either the plastics or internal components.

Many of the intergrated devices used in this equipment are vulnerable to damage from electro-static charges. Ensure that adequate static protection is in place when handling, shipping and servicing the internal components of this equipment.

4.2 Recommended Tools

The following tools are recommended for use during the assembly / disassembly of the T189.

- Anti-static Mat Kit - 0180386A82, includes:

Antistatic mat 66-80387A95
Ground Cord 66-80334B36
Wrist Band 42-80385A59

- Plastic Bladed Tool SLN7223A
- T6 Torx Driver

4.3 Disassembly Procedure

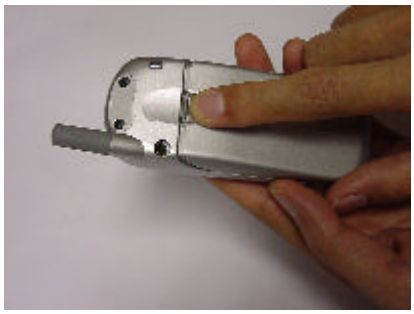
The following set of diagrams will demonstrate the correct sequence and action required to disassemble the T189

.

4.4 Assembly Procedure

Once the unit is disassembled and the repair is carried out, the unit must then be reassembled, this is carried out in the exact reverse order as the disassembly.

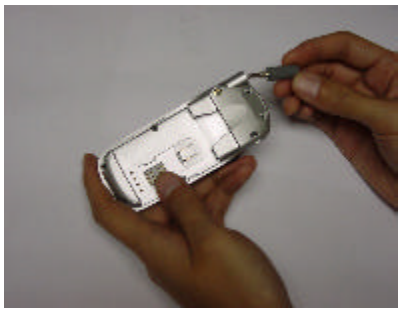
Many of the intergrated devices used in this equipment are vulnerable to damage from electro-static charges. Ensure that adequate static protection is in place when handling, shipping and servicing the internal components of this equipment.



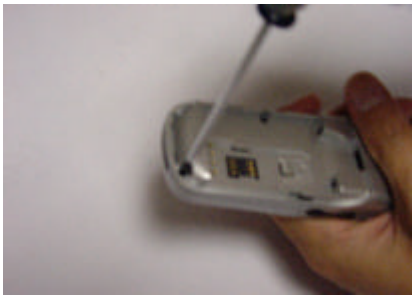
1. Remove battery door by pressing down on

latch and pulling back

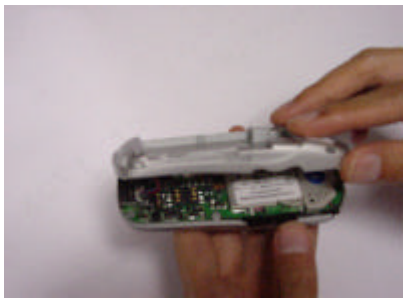
2. Remove Batteries



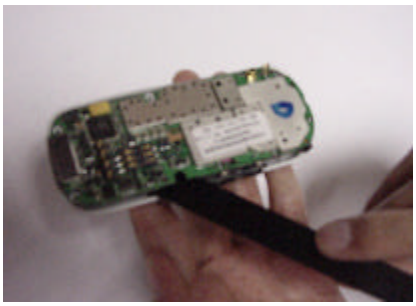
3. Remove antenna by rotating anti-clockwise



4. Unscrew 6 retaining screws using T6 Torx driver
find screw locations on page 4

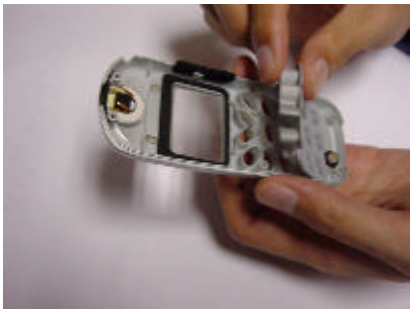


5. Remove rear
housing from unit.

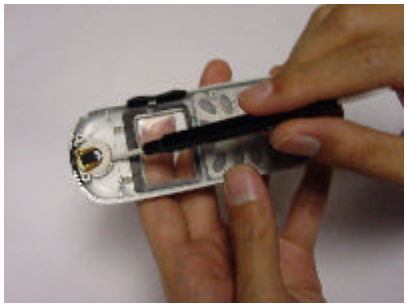


6. Slide plastic tool in between
front
housing and PCB and prise PCB
out.

7. Remove the rubber side
panels
the
unit.

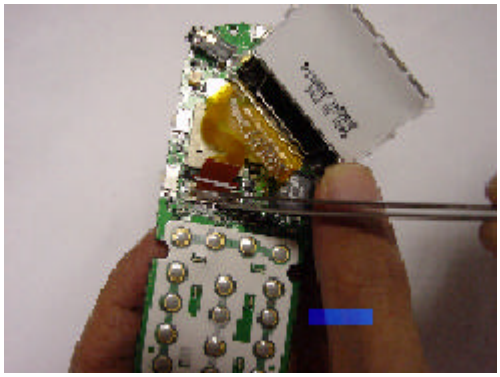


8. Remove Keypad



9. Remove alert speaker from front housing

10. Carefully prise display LCD
from main board by releasing catches on each side of LCD frame



11. Carefully lift the flip of the ZIF connector and remove the flex Note: The flex is very fragile.

4.5 Exploded Parts Diagram

1

2

3

4

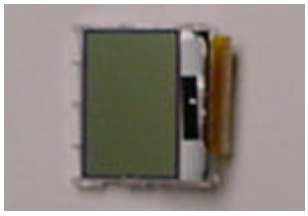
5

6

7

8

9



10

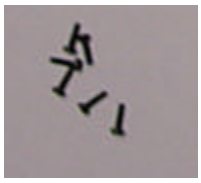
11

12

13

14

15



4.5Replacement Parts

1	**TBD**	
2	Front Housing	
3	Rear Housing	
4	Battery cover	
5	Vibrator	
6	Antenna	
7	Number Keypad	
8	Mylar Dome	
9	LCD ASSY	
10	LCD Lens	
11	Mic & Grommet	
12	Speaker earpiece	
13	Side Key	
14	Power Key	
15	Screw	

SECTION 5: SIM CARDS AND SECURITY

5.1 Manual Test Mode

The GSM Motorola T189 is equipped with a manual test mode capability. This capability allows service personnel to take control of the unit, and by entering certain keypad commands, make the unit performs desired functions.

To enter the manual test command mode, a GSM / DCS mini test sim (Part No 8102430Z04) must be used.

The test sim is inserted into the SIM slot in the side of the phone (See **figure 6.**1), the battery should then be inserted and the unit powered on. The # button should then be pressed for approximately 3 second until ‘test’ appears on the display, and the correct commands must then be followed.

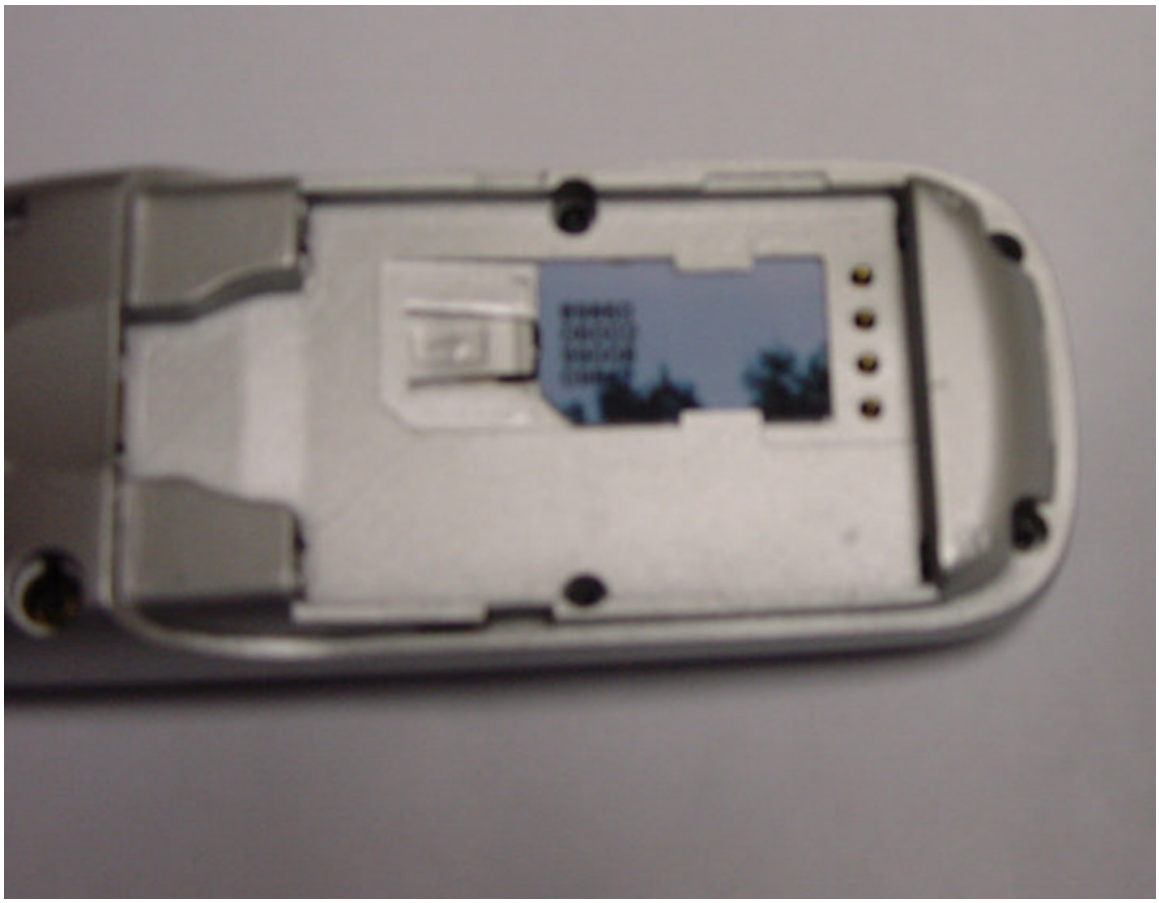


Figure 6.1 SIM Card insertion

5.2 Live Sim Card

A SIM (Subscriber Identity module) card will be required to access the existing local GSM / DCS cellular network, or remote networks when travelling. (If the roaming agreement has been made with the provider.)

The SIM card contains all the data necessary to access GSM services, and also:

- The ability to store user information such as phone numbers etc…
- All information required by the network provider to provide use to the network

5.3 Personality Transfer

No personality transfer available on this product.

5.4 GSM Test Commands

This is a list of Level 1 and 2 Test commands available to T189

Table 5.1 Test commands

Key Sequence	***Test Function/Name***
#(hold down for 2 seconds)	Enter manual test mode
01#	Exit manual test mode
07x#	Mute RX audio path

08#	Unmute RX audio path
09#	Mute TX audio path
10#	Unmute TX audio path
15x#	Generate tone
16#	Mute tone generator
19#	Display S/W version number of Call Processor
20#	Display S/W version number of Modem
36#	Initiate acoustic loopback
37#	Stop test
38#	Activate Mini SIM
39#	Deactivate Mini SIM
43x#	Change audio path
51#	Enable sidetone
52#	Disable sidetone
54X#	Show Service Indicator LED 0 - Off / 1 – Red / 2 – Green / 3 – Amber (Flip must be Closed)
57#	Initialize non-volatile memory
58#	Display security code
58xxxxxx#	Modify security code
59#	Display lock code
59xxx#	Modify lock code
60#	Display IMEI
980# / 981#	DCS / GSM mode
99#	Display all display pixels

15XX#			**36XX#**	
			0 or Omitted	Full Rate
			1	Enhanced Full rate
91	Constant Ringer		2	Half Rate

5.5 Identity and Security

Each Motorola T189 will be labelled with various number configurations. The following information describes what these configurations mean.

MSN

The mechanical Serial Number (MSN) is an individual unit identity number and will remain with the unit throughout the life of the unit.

The MSN can be used to log and track a unit on Motorola's EPPRS system.

The MSN is divided into 4 sections.

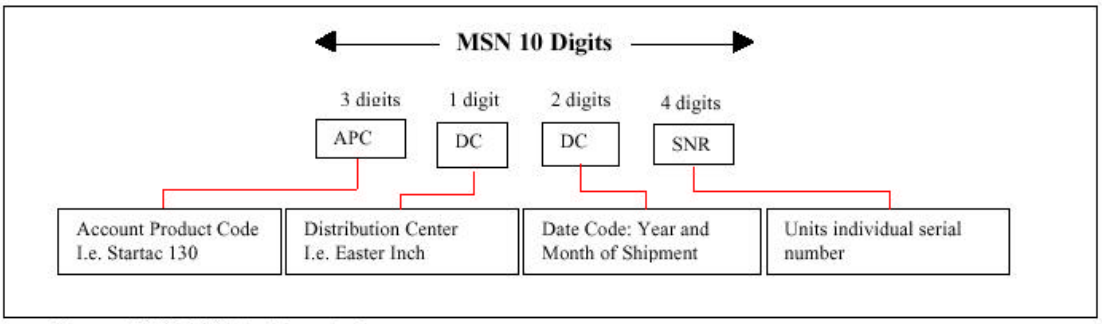


Figure 5.2 MSN label breakdown

IMEI

The International Mobile station Equipment Identity (IMEI) number is an individual number unique to the PCB and is stored within the unit's memory. The following figure gives a description of the make up of this number.

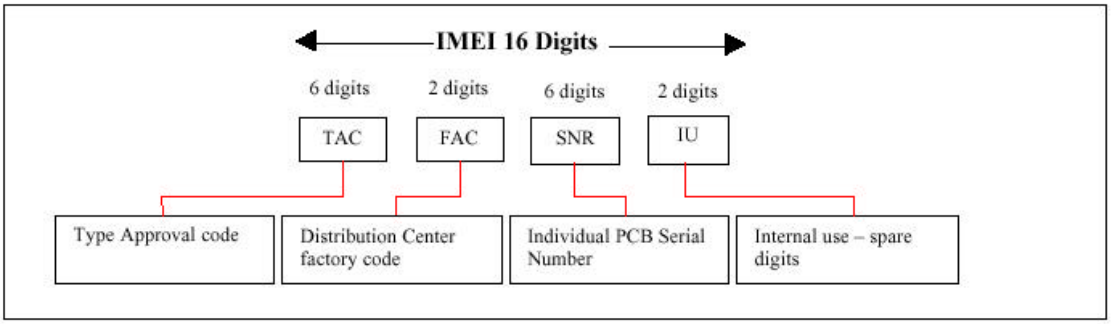


Figure 5.3 IMEI label breakdown

Some other label number configurations that will be present will be: **-XCVR**
NUMBER: Identifies type of product. i.e. T189 (Usually SWF number)
PACKAGE NUMBER: Determines type of equipment, mode in which it was shipped and language with which it was shipped.

SECTION 6: REPAIR AND TEST PROCEDURES

6.1 Repair Introduction

The T189 is divided into 3 main sections when it comes to part replacability: The Flip which contains the speaker,battery connections, RTC battery and Vibrator. The housings that contain the main PCB which contains RF / Logic circuitry. The third component is the the keypad and Display Assy. If the RF / Logic board is required to be changed then a full service tranceiver should be ordered as there is no replacement PCB available. Also a personality transfer would be necessary.

6.2 Mechanical repairs

Assembly replacement level troubleshooting and repair of the T189 is limited to isolation and replacement of the main mechanical parts only (See Exploded parts diagram and associated parts list)

6.3 Basic Modular Troubleshooting

The troubleshooting information in **Table 2** shows some typical malfunction symptoms, and for the corresponding verification and repair procedures refer to the disassembly instructions located in the disassembly section of this manual. **(Section 5).**

NOTE Defective Logic/RF assemblies must be replaced with pre-tested, pre-phased assemblies

6.4 Repair Chart

Table 2. GSM T189 Cellular Telephone: Troubleshooting and Repair Chart. (Assembly Replacement Level).

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
Personal telephone will not turn on or stay on	a) Battery pack either discharged or defective	Replace batteries with known good cells. Power unit on. If unit powers on OK replace batteries. If battery is not at fault, proceed to b.
	b) Battery connectors open or misaligned.	Visually inspect the battery connectors on the rear housing top and bottom. Check for bad alignment or dirty contacts. Re-align, clean and, if necessary, replace the rear housing. If battery connectors are not at fault, proceed to c
	c) Logic/RF Board Assembly Defective.	Remove the Logic/RF Assembly. Substitute a known good assembly and temporarily reassemble the unit. Depress the **PWR** button; if unit turns on and stays on, disconnect the dc power source and reassemble the telephone with the new Logic/RF Board assembly. If unit does not power up proceed to d)
	d) Display circuit failure	Disassemble unit and remove LCD module and insert known good module. Insert Battery and depress **PWR** button. Ensure unit stays on, if OK reassemble unit in new housing assembly
2. Personal telephone exhibits poor reception and/or erratic operation (such as calls frequently dropping, weak and/or distorted audio, etc.).	a) Antenna is defective	Check to make sure that the antenna is properly inserted into the front housing. If OK, substitute a known good antenna. If the fault is still present, proceed to b.
	b) Logic/RF Board Assembly Defective.	Replace Logic/RF Assembly (refer to symptom 1c). Verify that the fault has been cleared and Re-assemble the unit with the new PCB.
3. Display is erratic, or provides Partial or no display.	a) Mating connections to / from Display PCB.	Dissasemble unit, and remove display module from main PCB, check connector for any signs of corrosion or damage. If damaged proceed to c)
	b) Display Module is Defective.	Substitute a known good Display Module onto the suspect main board and connect to DC Pwr supply depress **PWR** and ensure display is now

		correct, If Ok rebuild unit with new Display assembly. If display assembly is not at fault proceed to c.
	c) Logic/RF Board Assembly Defective.	Replace Logic/RF Assembly (refer to symptom 1c). Verify that the fault has been cleared and Re-assemble the unit with the new PCB.

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
4. Incoming call alert transducer audio, distorted or volume is too low.	a) Faulty alert Transducer	Replace Alert Transducer from rear housing refer to disassembly procedure.If not Alert then proceed to b)
	b)Main RF / Logic PCB defective	Replace Logic/RF Board Assembly (refer to symptom 1c). Verify that the fault has been cleared and re-assemble the unit with the new PCB.
5. Personal telephone transmit audio is weak, (usually indicated by called parties complaining of difficulty in hearing voice from personal phone).	a) Microphone connections to the main RF / Logic board are defective.	Gain access to the Microphone as described in the DISASSEMBLY instructions in this manual. . Check connections. If connector is faulty proceed to c if the connector is OK, proceed to b.
	b) Microphone defective	Gain access to microphone .Disconnect and substitute a known good Microphone. Place a call and verify as heard by called party. If good, re-assemble unit with new Microphone. If Microphone is not at fault, re-install original Microphone and proceed to c.
	b) Logic/RF Board Assembly defective.	Replace Logic/RF Board Assembly (refer to symptom 1c). Verify that the fault has been cleared and re-assemble the unit with the new PCB.
6. Personal telephone receive audio is weak and/or distorted. (From speaker)	Dirty Contacts / Misalignment of contacts or faulty speaker.	Ensure pads on PCB are clean and that speaker contacs are sat almost vertical to each other. If Ok replace with known good speaker and check for call quality. If still poor proceed to c)
	c) Antenna assembly is defective.	Attempt a re-phasing of the unit and recheck the symptom. If symptom is the same but unit re-phases correctly, check to make sure the antenna connector is correctly soldered to the main board and that the antenna is fitted correctly. If ok, substitute a known good antenna assembly. If this does not cure the fault, re-install the original antenna then proceed to d).
	d) Logic/RF Board Assembly Defective.	d) Replace Logic/RF Assembly (refer to symptom

		1c). Verify that the fault has been cleared and Re-assemble the unit with the new PCB.
7. Personal telephone will not recognize/accept SIM card	a) SIM card defective	Initially check that the contacts on the card are not dirty. Clean if necessary, and check if fault has been eliminated. If the contacts are clean, insert a Known good SIM card into the unit. Power up the unit and confirm whether or not the card has been accepted. If the fault no longer exists, the defective SIM card should be replaced. If the SIM card is not at fault, proceed to b.
	d) Logic/RF Board Assembly Defective.	Replace Logic/RF Board Assembly (refer to symptom 1c). Verify that the fault has been cleared and re-assemble the unit with the new PCB.

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
9. Internal Charger not working	a) Batteries faulty	Replace suspect batteries with known good items. Insert charger and ensure battrey charging icon flashes if OK, replace batteries if batteries still do not charge proceed to b)
	a) Faulty charger circuit on main board defective	Replace Logic/RF Board Assembly (refer to symptom 1c). Verify that the fault has been cleared and re-assemble the unit with the new PCB.
10. No / Weak audio when using	a) Headset not fully pushed	Fully ensure the ‘click’ is felt on the jack socket. If

headset	home	still no audio proceed to b)
	b) Faulty Jack Socket / Defective PCB	Replace Logic/RF Board Assembly (refer to symptom 1c). Verify that the fault has been cleared and re-assemble the unit with the new PCB.

6.5 Software Upgrade

For information on setting up and equipment required for the flashing of software, contact should be made with the local technical support engineer.

6.6 Flexing

For information on setting up and equipment for flexing, contact should be made with the local technical support engineer.

6.7 Testing on HP8922

SECTION 7: ACCESSORIES (TBD)

SECTION 8: SALES MODELS (TBD)

SECTION 9: GLOSSARY OF TERMS

9.1 List of Abbreviations

Those marked ** are Motorola specific abbreviations.

A Interface Interface between MSC and BSS
A3 Authentication algorithm
A5 Stream cipher algorithm
A8 ciphering key generating algorithm
AB Access Burst
A-bis Interface between BSC and BTS
ACCH Associated Control Channel
ACSE Association Control Service Element
AGCH Access Grant Channel
AMPS Advance Mobile Phone System
AOC Advice of charge
ARFCN Absolute Radio Frequency Channel Number
ARQ Automatic Request for retransmission
ASIC Application Specific Integrated Circuit
AUC Authentication Center
AUT (H) Authentication
BA BCCH Allocation
BAIC Barring of All Incoming Calls
BAOC barring of all Outgoing Calls
BCC Base Transceiver Station (BTS) Color Code
BCCH Broadcast Control Channel
BCD Binary Coded Decimal
BCU BTS Control Unit **
Bm Full-rate traffic channel
BN Bit Number
BS Base Station
BSC Base Station Controller
BSIC Base Transceiver Station Identity Code
BSS Base Station System
BSSAP BSS Application Part (DTAP and BSSMAP)
BSSC Base Station System Control Cabinet **
BSSMAP Base Station Systems Management Application Part
BSSOMAP BSS Operation and Maintenance Application Part
BSU Base Site Controller Unit **
BTS Base Transceiver Station
CA Call Allocation
CBCH Call Broadcast Channel
cc Call Control
cc Country Code
CC Cellular Cassette
CCBS Completion of Calls to Busy Subscribers
CCH Control Channel
CCCH Common Control Channel
CDMA Code Division Multiple Access
CFS Call Forwarding on mobile Subscriber busy
CFU Call Forwarding Unconditional
CLIP Calling Line Identification Presentation
CLIR Calling Line Identification Restriction
CM Connection Management
COLP Connected Line identification Presentation
COLR Connected Line identification Restriction

CONF Conference Call add on

CSPDN Circuit Switched Public Data Network
CUG Closed User Group
CW Call Waiting
DB Dummy Burst
DBS Distributed Base Station **
DCCH Dedicated Control Channel
DET Detach
DFE Decision Feedback Equalizer
DISC Disconnect
DL Data Link (layer)
Dm Control Channel (ISDN terminology applied to mobile service)
Dm Signaling channel
Dp Dialed Pulse
DRCU Diversity Radio Channel Unit**
DRX Discontinuous Reception
DTAP Direct Transfer Application Part
DTE Data Terminal Equipment
DTMF Dual Tone Multi-Frequency (tone signaling type)
DTX Discontinuous Transmission
E erlang
Eb/No Energy per Bit/Noise floor
EC Echo Canceller
Ec/No Ratio of energy per modulating bit to the noise spectral density
EGSM Extended Group special Mobile
EFR Enhanced Full Rate
EIR Equipment Identity Register
EIRP Effective Isotropic Radiated Power
EMC Electromagnetic Compatibility
EMX Electronic Mobile Exchange **
ETSI European Telecommunications Standards Institute
FACCH Fast Associated Control channel
FACCH/F Full rate Fast Associated Control channel
FACCH/H Half rate fast Associated Control channel
FB Frequency correction burst
FCCH Frequency Correction Channel
FEC Forward Error Correction
FN Frame Number
FR Full Rate
FTAM File Transfer Access Management
GCC Global Call Center
GMSC Gateway Mobile Services Switching Center
GMSK Gaussian Minimum Shift Keying
GSM Group Special Mobile
GSM MS GSM Mobile Station
GSM PLMN GSM Public Land Mobile Network
HANDO Handover
HDLC High Level Data Link Control
HLR Home Location Register
HOLD Call Hold (Supplementary Service)
HPLMN Home PLMN
HPU Hand Portable Unit
HR Half Rate
HSN Hopping Sequence Number

I Information (frames)
IA5 International Alphanumeric 5
ID Identification
IMEI International Mobile Equipment Identity
IMM Immediate assignment message
IMSI International Mobile Subscriber Identity
IN Intelligent Network
INDY Iridium 9500 handset
ISC International Switching Center
ISU Iridium Subscriber Unit
ISDN Integrated Services Digital Network
ISUP ISDN User Part
IWF Interworking Function
Kc ciphering Key
Ki Individual subscriber authentication key
LAC Location Area Code
LAI Location Area Identification (Identity)
LAPB Link Access Procedure 'B' (balanced) channel
LAPDm Link Access Procedure 'DM' (mobile 'D') channel
Lm Traffic channel (with capacity lower than Bm)
LPC Linear Predictive Code
LR Location Register
MA Mobile Allocation
MAH Mobile Access Hunting
MAI Mobile Allocation Index
MAIO Mobile Allocation Index Offset
MAP Mobile Application Part
MCC Mobile Country Code
MCI Malicious Call Identification
MD Mediation Device
ME Mobile Equipment
MF Multi-Frequency (tone signaling type)
MLSE Maximum Likelihood Sequence Estimator
MM Mobility Management
MMI Man Machine Interface
MNC Mobile Network Code
MO Mobile Originated
MO/PP Mobile Originated Point to Point messages
MoU Memorandum of Understanding
MRN Mobile Roaming Number
MS Mobile Station
MSC Mobile Services Switching Center
MSCM Mobile Station Class Mark
MSIN Mobile Station Identification Number
MSISDN Mobile Station international ISDN number
MSRN Mobile Station Roaming Number
MT Mobile Termination
MTP Message Transfer Part
MT/PP Mobile Terminated Point to Point messages
NAMPS North American-Advance Mobile Phone System
NB Normal Burst

NE Network Elements

NET Norme European de Telecommunications
NM Network Management
NHC Network Management Center
O&M Operations and Maintenance
OACSU Off Air Call Set-Up
OCB Outgoing Calls Barred
OMAP Operations and Maintenance Application Part (previously was OAMP)
OMC Operations and Maintenance Center
OMCR Operations and Maintenance Center -Radio Part
OMCS Operations and Maintenance Center -Switch Part
OTA Over The Air Programming
OSI Open System Interconnection
PAD Packet Assembly Disassembly facility
PCH Paging Channel
PDN Public Data Networks
PIN Personal Identification Number
PLMN Public Land Mobile Network
POTS Plain Old Telephone Service (basic telephone services)
PSPDN Public Switched Packet Data Network
PSTN Public Switched Telephone
PTO Public Telecommunications Operator
QOS Quality of Service
RAB Random Access Burst
RACH Random Access Channel
RBDS Remote BSS Diagnostic Subsystem **
RBU Remote Base Station Unit (PCN) **
RCU Radio Channel Unit **
REC Recommendation
REL Release
RELP-LTP Regular Pulse Excitation - Long Term Prediction
REQ Request
RFCH Radio Frequency Channel
RFN Reduced TDMA Frame Number
RLP Radio Link Protocol
ROSE Remote Operations Service Element (a CCITT specification for O&M)
RXCDR Remote Transcoder Unit **
RXLEV Received signal level
RXQUAL Received signal quality
SABM Set Asynchronous Balance Model
SACCH Slow Associated Control Channel
SAPI Service Access Point Indicator (Identifier)
SB Synchronization Burst
SC Service Center
SCCP Signaling Connection Control Part
SCH Synchronization Channel
SCP Service Control Point - an intelligent network entity
SDCCH Stand-alone Dedicated Control Channel
SDL Specification Description Language
SFH Slow Frequency Hopping
SIM Subscriber Identity Module
SMS Short Message Service
SMSCB Short Message Service Call Broadcast

SND SeND

SP Signaling Point
SRES Signed RESponse (authentication)
SS Supplementary Service
SS System Simulator
STP Signaling Transfer Point
SYSGEN SYStem GENeration
TA Terminal Adapter
TA Timing Advance
TCAP Transaction Capabilities Application Part
TCH Traffic Channel
TCH/F A full rate TCH
TCH/FS A full rate speech TCH
TCH/HS A half rate speech TCH
TCP Transmission Control Protocol
TDMA Time Division Multiple Access
TE Terminal Equipment
TMN Telecommunications Management Network
TMSI Temporary Mobile Subscriber Identity
TN Timeslot Number
TRX Transceivers
TTY TeleTYpe (refers to any terminal)
TS Time Slot
TUP Telephone Users Part
UI Unnumbered Information frame
Um Air Interface
VAD Voice Activity Detection
VLR Visited Location Register
VLSI Very Large Scale Integration (IC)
VPLMN Visited PLMN
XC Transcoder
XCDR Transcoder **
3PTY Three party service

Tai Shan

DUAL BAND

Tai Shan

DUAL BAND

Tai Shan

Product Features

- **Platform multiple forms/looks**
- **Dual band CSM900/1800**
- **Full matrix 96x64 graphics display with 13 soft icons**
- **Integrated headset jack**
- **Side Mounted Volume Switches**
- **SIM toolkit**
- **Microbrowser (UP 3.1) Capable**

Tai Shan

Product Features

* **Size 108mm x42 mm x18 mm (120 cc)**
* **Weight 120 g**
* **Talk Time 150--210 min**
* **Standby 100 --200hours**

Tai Shan

Design Approach

* **3.6 V Platform**
* **3.6 V LDMOS PA Application**
* **VCO Modules**
* **Front End IC**
* **No Accessory Connector**
* **Stacked Flash Memory/SRAM**
* **Individual Battery Cells vs.. Battery Pack**
* **Leap charge circuit**

Tai Shan

The main updates based on shark

Phone Book: 100 phone memory, SIM card memory (20+)

Leap charging circuitry and software.

Clock/Alarm with battery backup.

Vibrator.

MMI refreshment

Butt-plug circuitry migration from Leap

WAP removed

Tai Shan

The main updates based on shark

WAP removed

Games

Calculator *(To be confirmed)*

Edit / Send Ringer Tone via SMS

SMS with CLI

No personalized banners

No quick access key (cd928 type keyboard)

Tai Shan

DISASSEMBLY

1.

Remove battery door by pressing down on clip and pulling back

2.

Remove the three batteries

Tai Shan

DISASSEMBLY

3.

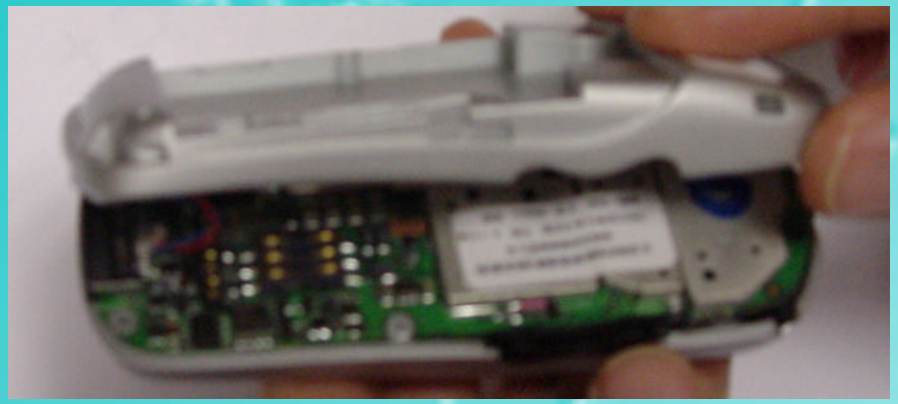
Press down and pull SIM card lid to right and lift. For removing pull horizontally to the left.

4.

Unscrew all 6 screws

Tai Shan

DISASSEMBLY



5.

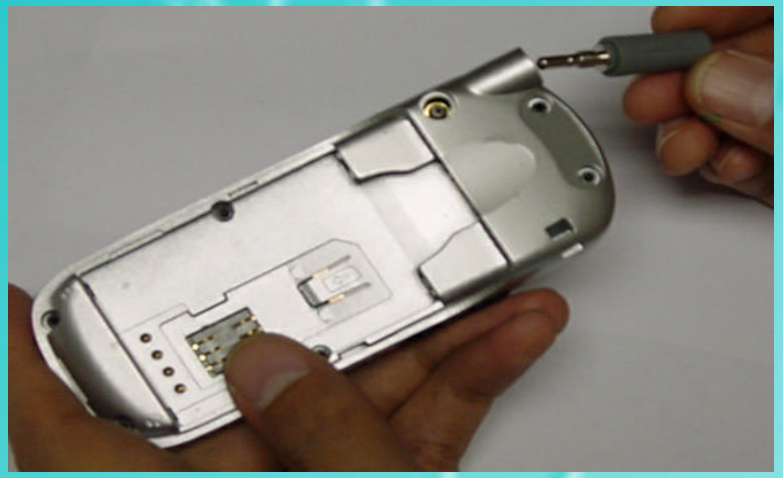
Lift off back housing

6.

Prise off alert from back housing

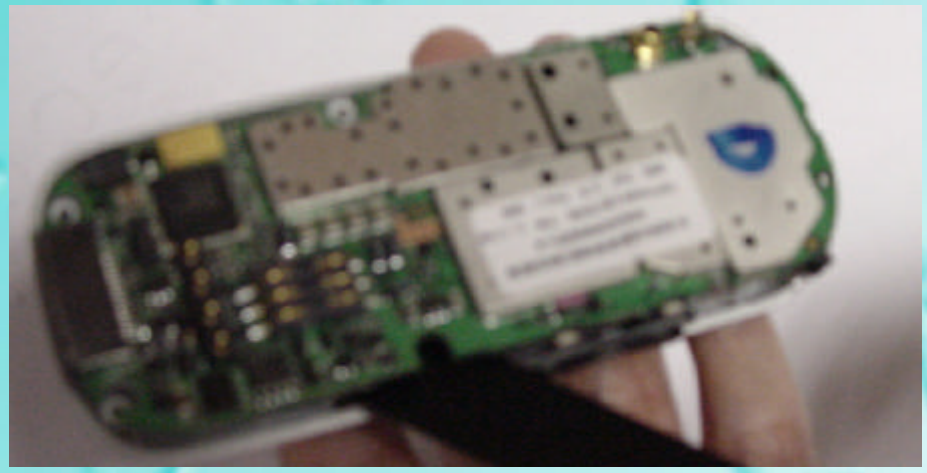
Tai Shan

DISASSEMBLY



7.

Unscrew Antenna and remove



8.

Lift PCB out of front housing

Tai Shan

DISASSEMBLY

9.

Remove Side Grip from front housing

10.

Remove keypad from front housing

Tai Shan

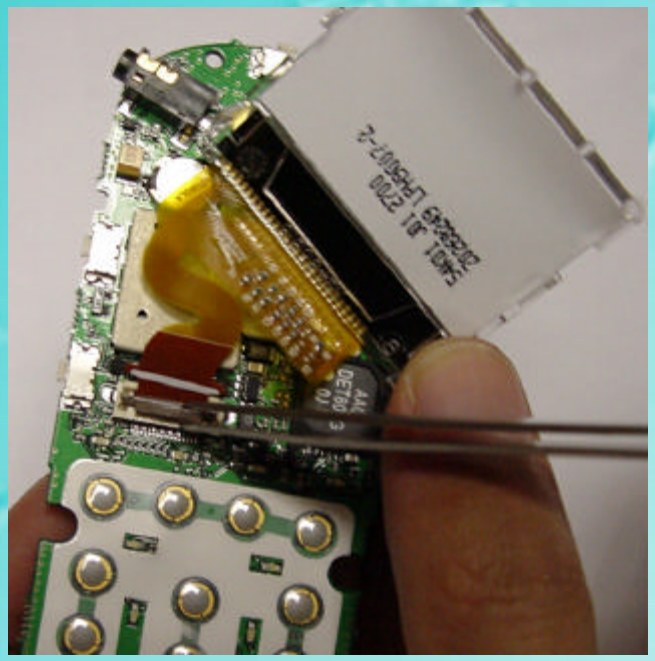
DISASSEMBLY

11.

Unclip display board latches at both sides of PCB and detach carefully

Tai Shan

DISASSEMBLY

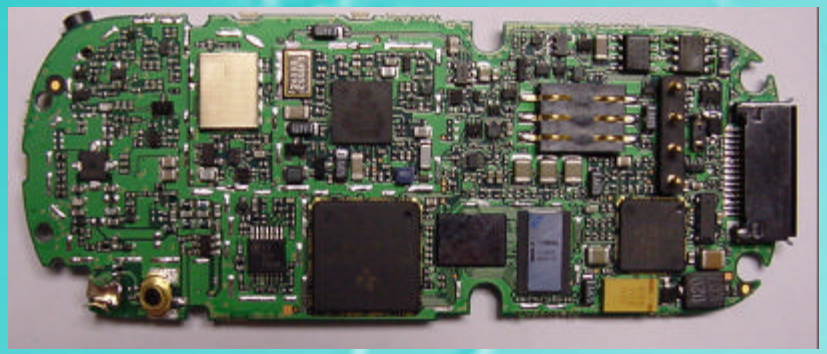


12.

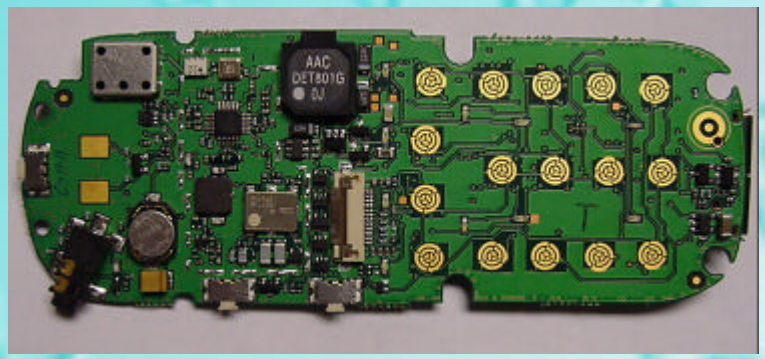
Lift hinge from ZIF connector and remove carefully flex-print

Tai Shan

DISASSEMBLY

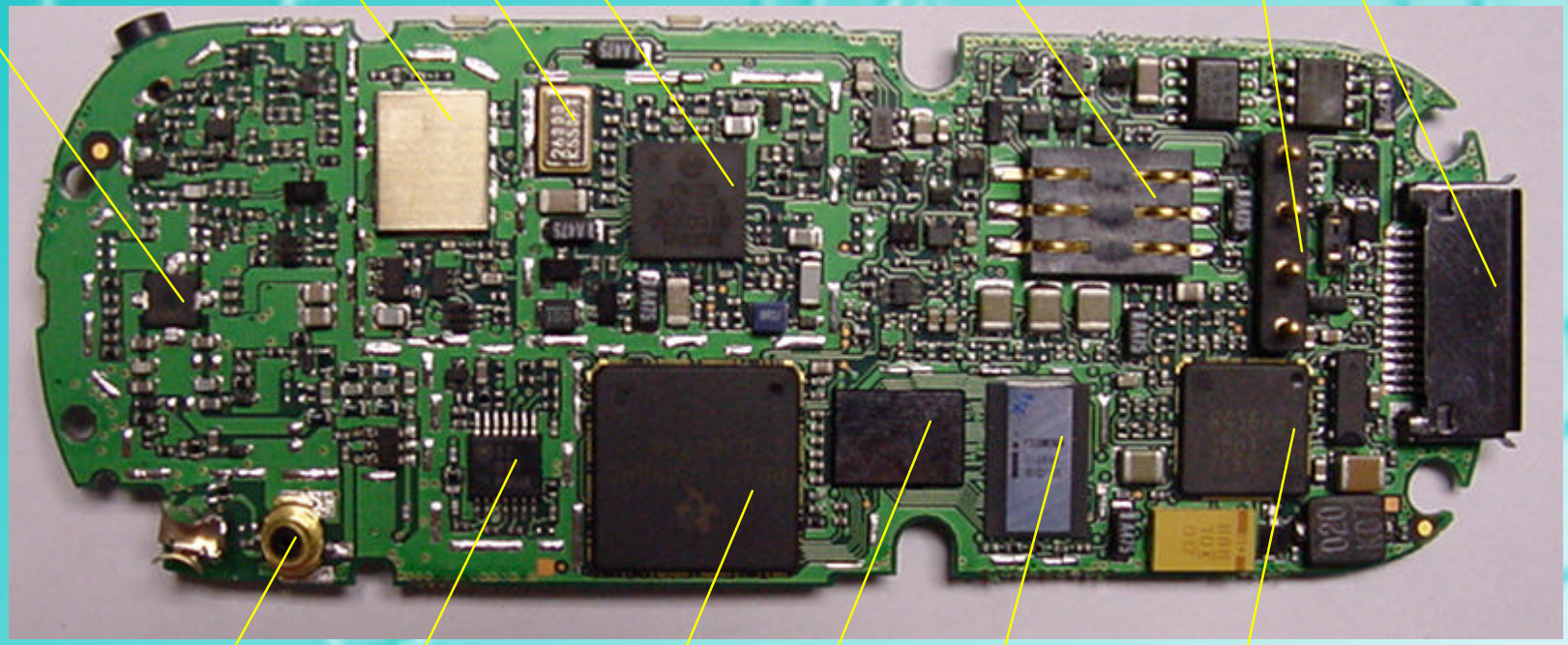


13.
bottom side

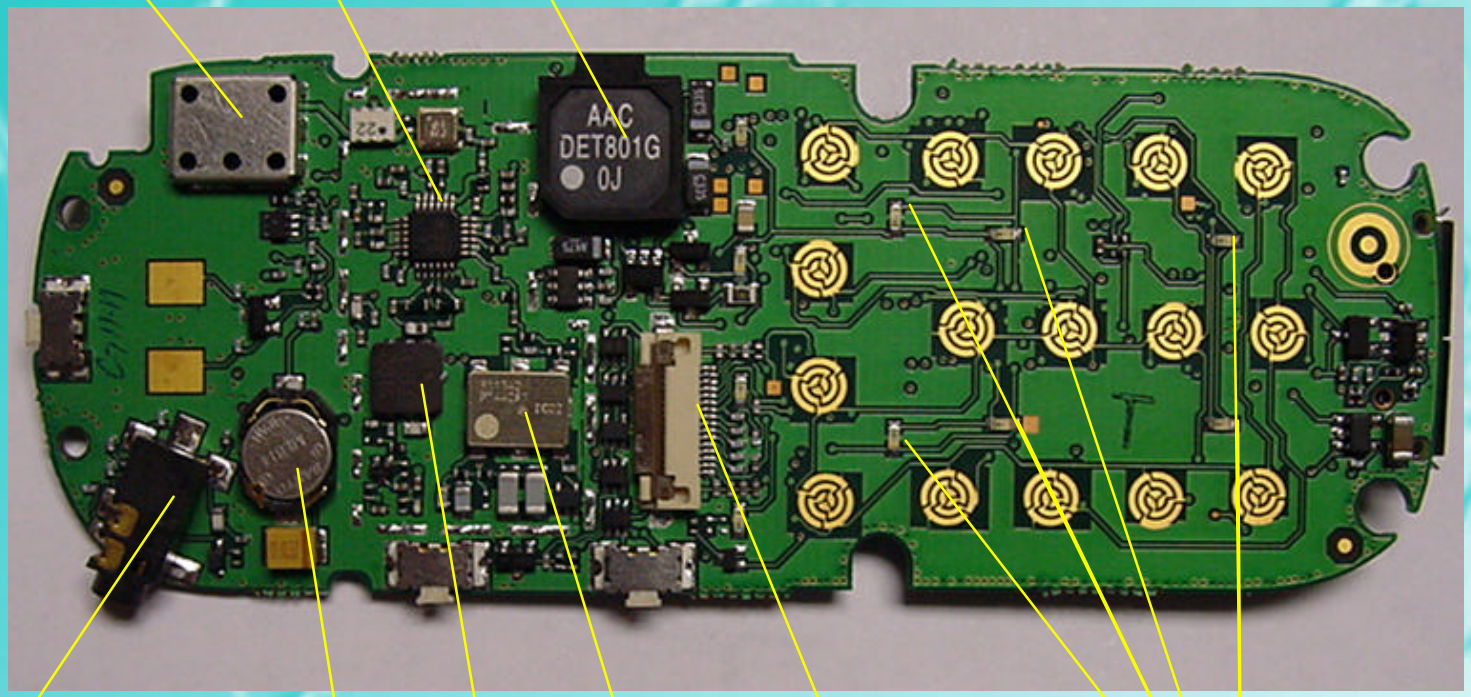


14.
top side

Tai Shan


Y200, 26Mhz crystal
U301
TX VCO
U200, Magic IC
J803 SIN CONN
J604 Battery CONN
J600
Ext CONN
Q370 TPA
J300
RF CONN
U350
PAC
U800
White Cap
U702
SRAM
U701
Flash ROM
U900
GCAPE

Tai Shan



U432
Front end IC

FL472
Filter

J510
Buzzer

J50504
Headset Jack

U905
Back up
battery

FL490
400Mhz
Filter

U253
RX VCO

J902
Display CONN

LED

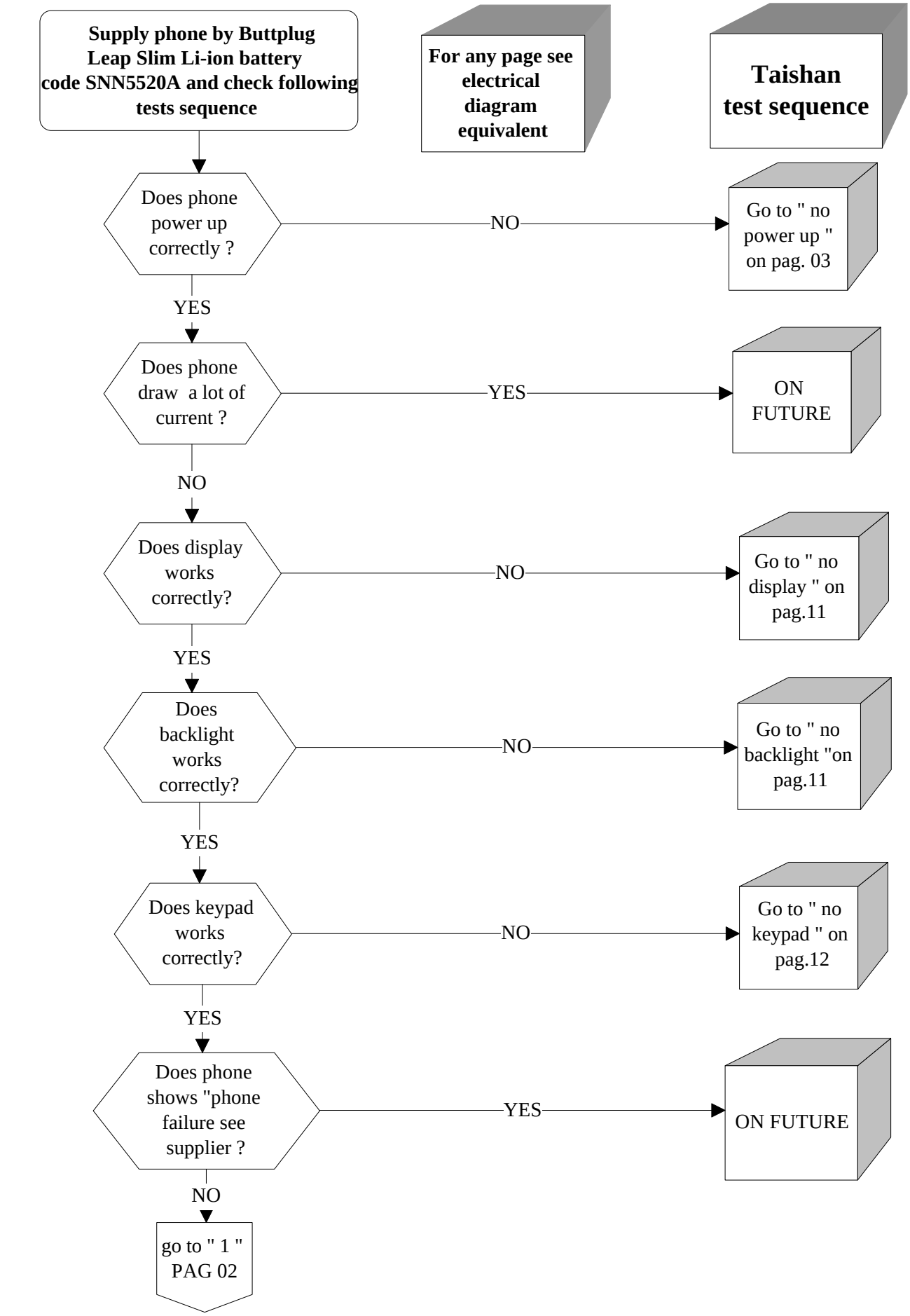
Dual Band Taishan

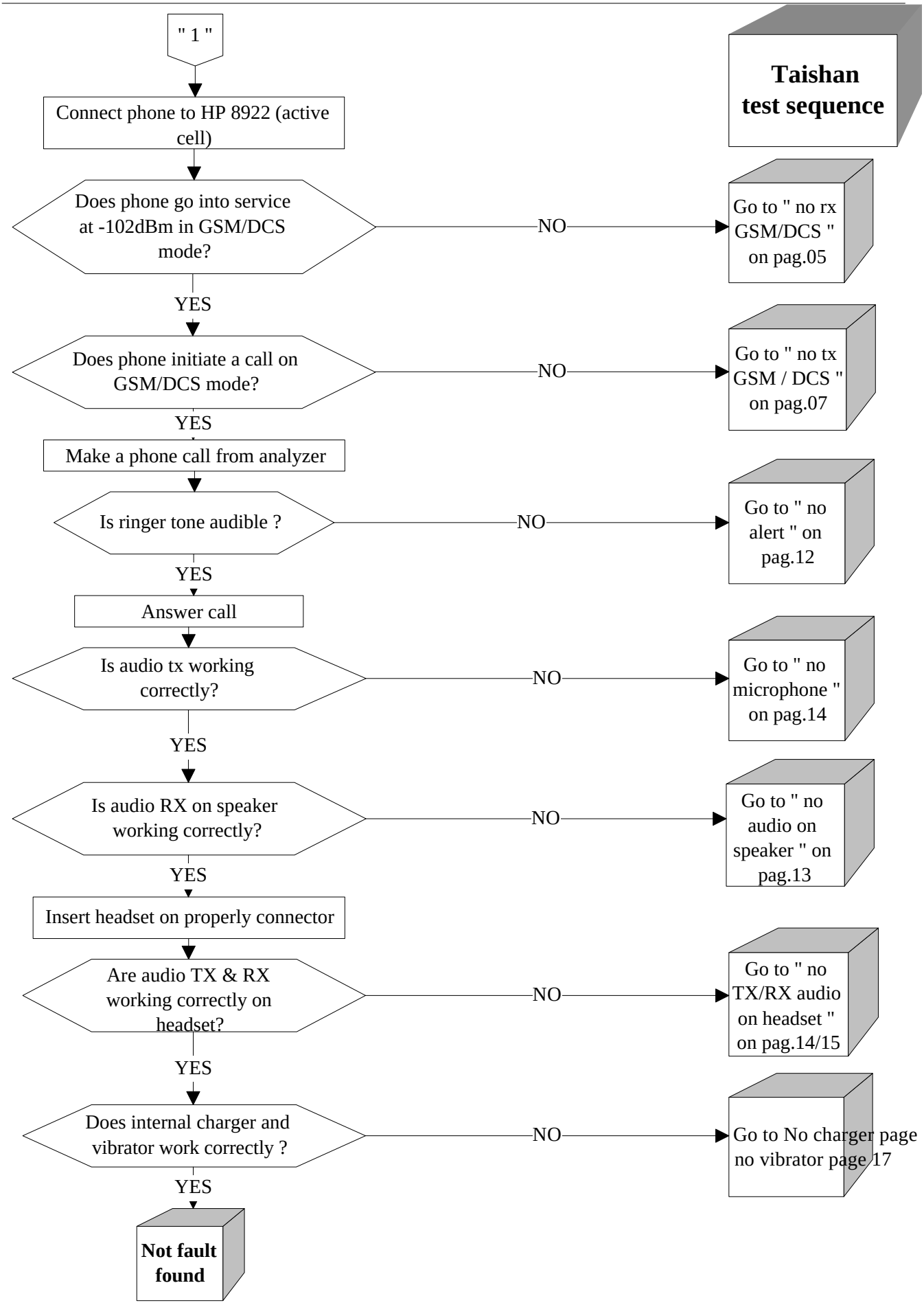
Dual band level 3 debug

Version: 1.0 Date: Nov , 30 , 2000 Total Pages: 19	Prepared by Tony Zhang Approved by _____

REVISION HISTORY

Version	Date	Name	Reason
1.0	**23/12/1999**	**Fabrizio Alba**	**First release**


Supply phone by Buttplug Leap Slim Li-ion battery code SNN5520A and check following tests sequence
For any page see electrical diagram equivalent
Taishan test sequence
Does phone power up correctly ?
NO
Go to " no power up " on pag. 03
YES
Does phone draw a lot of current ?
YES
ON FUTURE
NO
Does display works correctly?
NO
Go to " no display " on pag.11
YES
Does backlight works correctly?
NO
Go to " no backlight "on pag.11
YES
Does keypad works correctly?
NO
Go to " no keypad " on pag.12
YES
Does phone shows "phone failure see supplier ?
YES
ON FUTURE
NO
go to " 1 " PAG 02


" 1 "
Taishan test sequence
Connect phone to HP 8922 (active cell)
Does phone go into service at -102dBm in GSM/DCS mode?
NO
Go to " no rx GSM/DCS " on pag.05
YES
Does phone initiate a call on GSM/DCS mode?
NO
Go to " no tx GSM / DCS " on pag.07
YES
Make a phone call from analyzer
Is ringer tone audible ?
NO
Go to " no alert " on pag.12
YES
Answer call
Is audio tx working correctly?
NO
Go to " no microphone " on pag.14
YES
Is audio RX on speaker working correctly?
NO
Go to " no audio on speaker " on pag.13
YES
Insert headset on properly connector
Are audio TX & RX working correctly on headset?
NO
Go to " no TX/RX audio on headset " on pag.14/15
YES
Does internal charger and vibrator work correctly ?
NO
Go to No charger page 16 no vibrator page 17
YES
Not fault found

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb

NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

NO POWER UP

Supply phone using Ext_B+ (~4.5V) on Butt-plug

and check if phone power up correctly

YES

NO

set power supply generator to 4 Vcc and check if phone power up correctly

YES

Check Ext_B+ from J600 to CR903 if OK Check CR903, Q905 and NOTE1 or faulty.

NO

Make a short on W.D. line on R941 side (near C913) AND CHECK FOLLOWING FOLTAGES:
-V_BOOST = 5,6 V on C913
-V1 =5V on C906
-V2 =2,8 V on C939
(R905)-V3 = 1,8 V on C909
-SR_VCC = 2,8 V on R722
-VRef =2,8 V on C919
SEE TIMING SEQUENCE on Pag. 16 , 17.

NO

For V_BOOST issue check L901 , C980 , C970 , C981 , CR 902 , C913 for other voltages issues check any line for short or different resistence (compare with a good one).

YES

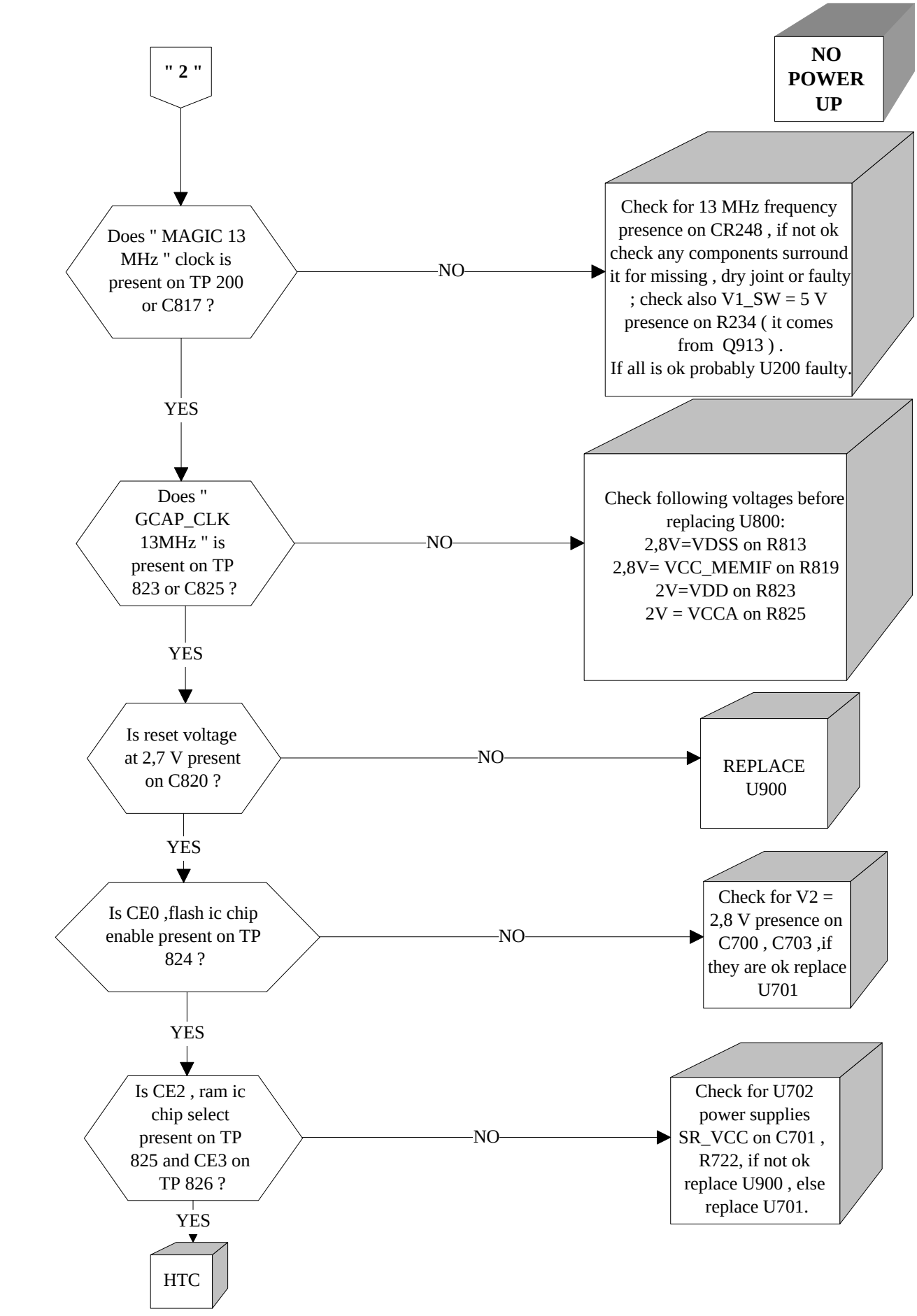
Does 26 MHz clock is present on L220 ?

NO

Check Y200 , C220 , L220 for missing , dry joint or faulty , check also for " VRef " voltage presence = 2,8 V on C213 , if not ok check line between C919 & C213. Finally check on C215 for "RF_V2 " voltage = 2,8 V presence and for " RF_V1 "voltage = 2,8 V on C217.

YES

Go to " 2 " on pag. 03


" 2 "
NO POWER UP
Does " MAGIC 13 MHz " clock is present on TP 200 or C817 ?
NO
Check for 13 MHz frequency presence on CR248 , if not ok check any components surround it for missing , dry joint or faulty ; check also V1_SW = 5 V presence on R234 (it comes from Q913) .
If all is ok probably U200 faulty.
YES
Does " GCAP_CLK 13MHz " is present on TP 823 or C825 ?
NO
Check following voltages before replacing U800:
2,8V=VDSS on R813
2,8V= VCC_MEMIF on R819
2V=VDD on R823
2V = VCCA on R825
YES
Is reset voltage at 2,7 V present on C820 ?
NO
REPLACE U900
YES
Is CE0 ,flash ic chip enable present on TP 824 ?
NO
Check for V2 = 2,8 V presence on C700 , C703 ,if they are ok replace U701
YES
Is CE2 , ram ic chip select present on TP 825 and CE3 on TP 826 ?
NO
Check for U702 power supplies SR_VCC on C701 , R722, if not ok replace U900 , else replace U701.
YES
HTC

Connect on J300 connector an RF generator , set frequency equal to 947,4 MHz level -30dBm . Set pcb in test mode and digit RX test command 450062#

NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

NO RX GSM/DCS

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb

Is IF at 400 MHz frequency present on C498 at correct level ?

NO → Go to " A " on pag .06

YES

Is RX_LO at 800 MHz frequency present on CR249 ?

NO → Check Q203 for correct bias :base = 1,7 V;collector= 2,7 V; emitter = GND .check also for any faulty on CR 249 and components surround it

YES

Check for data presence on:
- R299 BDR
- R299 BFSR
- R287 BCLKR

Note: digit 450062# for every point of measure

NO → With PCB in stand by check for data presence on SPI BUS:
TP 205
TP 206

YES

Does RX ACQ signal works correct whenever you digit 450062# test command , check this on TP "RX_ACQ"? See receiver timing below

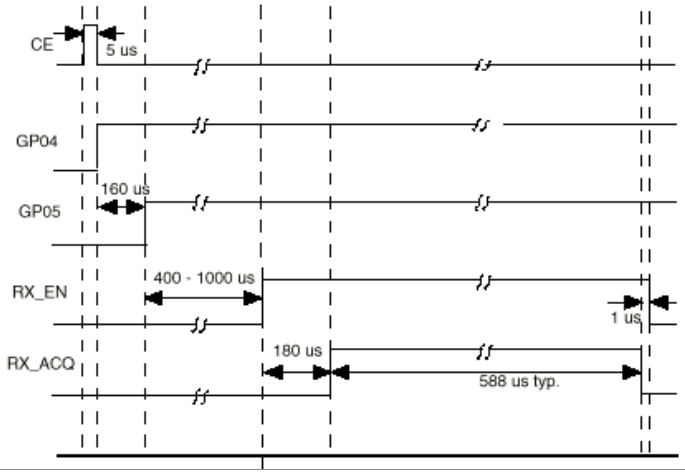
YES → Check U200 for faulty

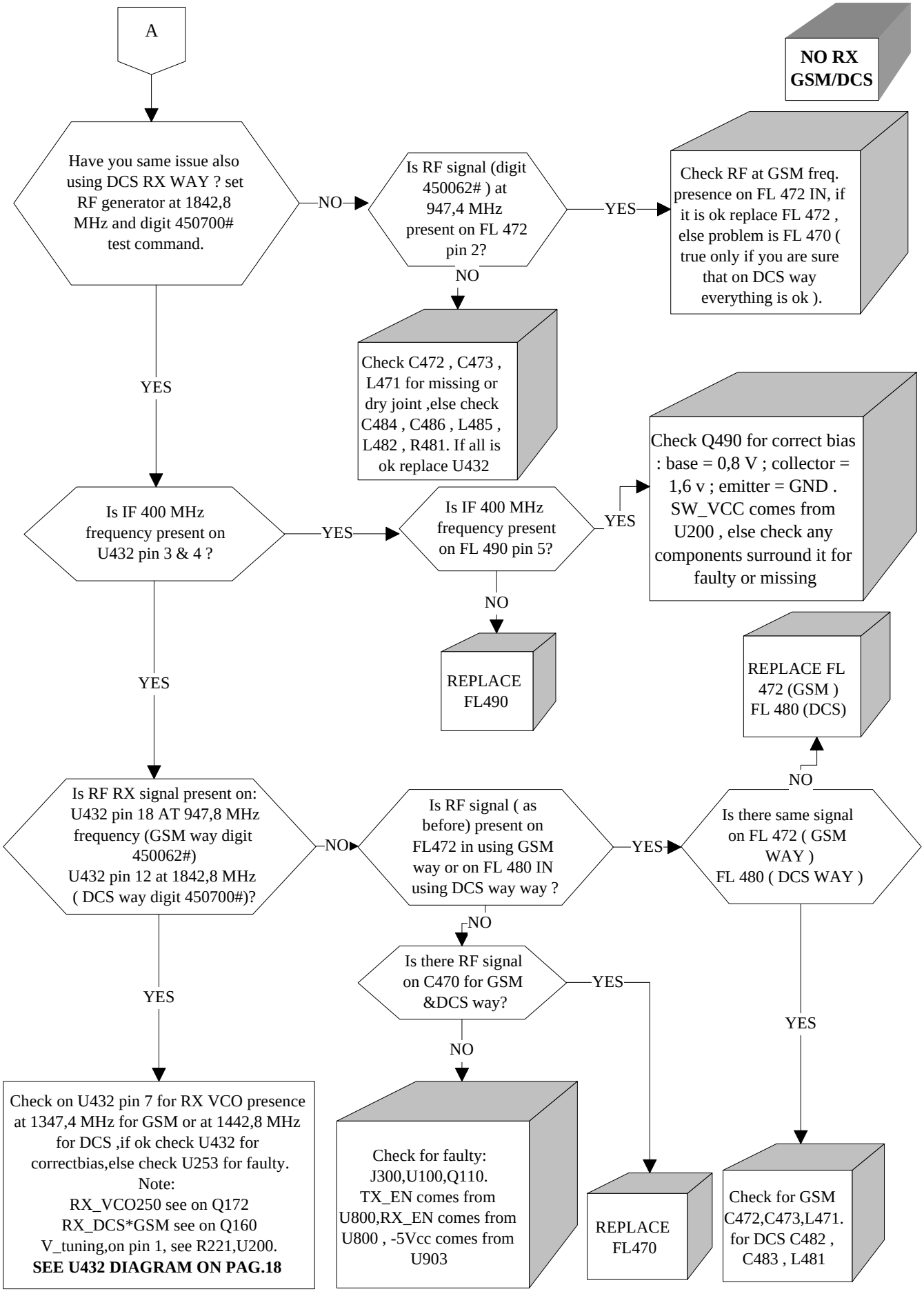
NO

YES

Problem could be U800,try to resolder it,after replace component.

Modulus 3 / MAGIC Receiver Timing




A
NO RX GSM/DCS
Have you same issue also using DCS RX WAY ? set RF generator at 1842,8 MHz and digit 450700# test command.
NO
Is RF signal (digit 450062#) at 947,4 MHz present on FL 472 pin 2?
YES
Check RF at GSM freq. presence on FL 472 IN, if it is ok replace FL 472 , else problem is FL 470 (true only if you are sure that on DCS way everything is ok).
NO
Check C472 , C473 , L471 for missing or dry joint ,else check C484 , C486 , L485 , L482 , R481. If all is ok replace U432
YES
Is IF 400 MHz frequency present on U432 pin 3 & 4 ?
YES
Is IF 400 MHz frequency present on FL 490 pin 5?
YES
Check Q490 for correct bias : base = 0,8 V ; collector = 1,6 v ; emitter = GND . SW_VCC comes from U200 , else check any components surround it for faulty or missing
NO
REPLACE FL490
YES
REPLACE FL 472 (GSM) FL 480 (DCS)
NO
Is RF RX signal present on: U432 pin 18 AT 947,8 MHz frequency (GSM way digit 450062#) U432 pin 12 at 1842,8 MHz (DCS way digit 450700#)?
NO
Is RF signal (as before) present on FL472 in using GSM way or on FL 480 IN using DCS way way ?
YES
Is there same signal on FL 472 (GSM WAY) FL 480 (DCS WAY)
NO
Is there RF signal on C470 for GSM &DCS way?
YES
YES
Check on U432 pin 7 for RX VCO presence at 1347,4 MHz for GSM or at 1442,8 MHz for DCS ,if ok check U432 for correctbias,else check U253 for faulty. Note: RX_VCO250 see on Q172 RX_DCS*GSM see on Q160 V_tuning,on pin 1, see R221,U200. SEE U432 DIAGRAM ON PAG.18
NO
Check for faulty: J300,U100,Q110. TX_EN comes from U800,RX_EN comes from U800 , -5Vcc comes from U903
REPLACE FL470
YES
Check for GSM C472,C473,L471. for DCS C482 , C483 , L481

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb

NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

NO TX GSM/DCS

NOTE 1 : You can use this procedure for GSM way & DCS way.
Whenever you have a signal with a simbol star (*****) means that it is active low if you select this kind of way , while the same point of measure will be high for other way.
Differences betwen GSM & DCS way are:
TX_GSM*DCS
used for adjust all RF TX way for GSM/DCS choise
for any problem check on Q160
DCS_SEL comes out from U200 (or pin 2 U110)
GSM_SEL comes out from U110 pin 4
-10 V comes out from U904.
DCS_TX_VCO , GSM_TX_VCO
for any problem check Q130

Connect on J300 connector an RF spectrum analyzer , set pcb in test mode and digit following test command:
110062# 1215# 40# for a test in **GSM** way.
110700# 1215# 40# for a test in **DCS** way.
Check for RF signal presence at frequency =
902.4 MHz for GSM or 1747.8 MHz for DCS .

RF IS PRESENT , NEVER MIND LEVEL BUT IS DIRTY

RF IS NOT PRESENT

RF IS PRESENT BUT IS LOW

Is RF TX signal at GSM/DCS frequency present on U301 pin 4 ?

YES

Is RF TX GSM/DCS present on Q370 DRAIN?

NO

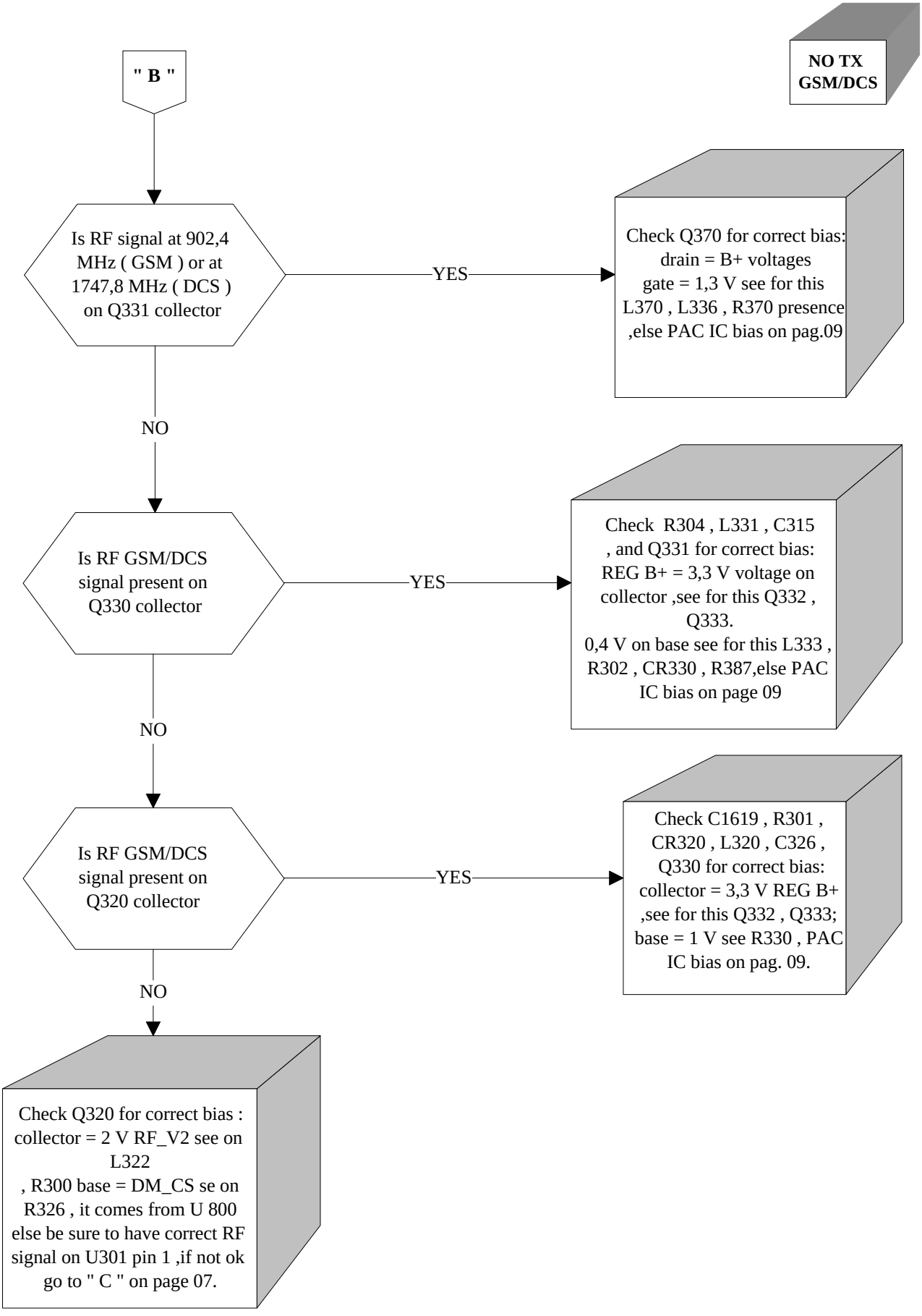
Go to " B " on pag.08

NO

YES

Check on U301:
pin 3 DCS_TX_VCO see on Q130 , Q140.
pin 8 GSM_TX_VCO see on Q130 , Q140.
pin 10 SF_OUT see on C246 (comes from U200 9.
pin6 CP TX check for this Q310 , Q311 , U310 , U200 , R305 , R306 , R307.
DM_CS , TX_EN , they comes from U800
V1_SW comes from Q913

Check:
L365 , L325 , L326 , C397for missing or dry joint , else check for faulty Q110 , U100.
-5V cc see U903
TX_EN , RX_EN comes from U800


NO TX GSM/DCS
" B "
Is RF signal at 902,4 MHz (GSM) or at 1747,8 MHz (DCS) on Q331 collector
YES
Check Q370 for correct bias: drain = B+ voltages gate = 1,3 V see for this L370 , L336 , R370 presence ,else PAC IC bias on pag.09
NO
Is RF GSM/DCS signal present on Q330 collector
YES
Check R304 , L331 , C315 , and Q331 for correct bias: REG B+ = 3,3 V voltage on collector ,see for this Q332 , Q333. 0,4 V on base see for this L333 , R302 , CR330 , R387,else PAC IC bias on page 09
NO
Is RF GSM/DCS signal present on Q320 collector
YES
Check C1619 , R301 , CR320 , L320 , C326 , Q330 for correct bias: collector = 3,3 V REG B+ ,see for this Q332 , Q333; base = 1 V see R330 , PAC IC bias on pag. 09.
NO
Check Q320 for correct bias : collector = 2 V RF_V2 see on L322 , R300 base = DM_CS se on R326 , it comes from U 800 else be sure to have correct RF signal on U301 pin 1 ,if not ok go to " C " on page 07.

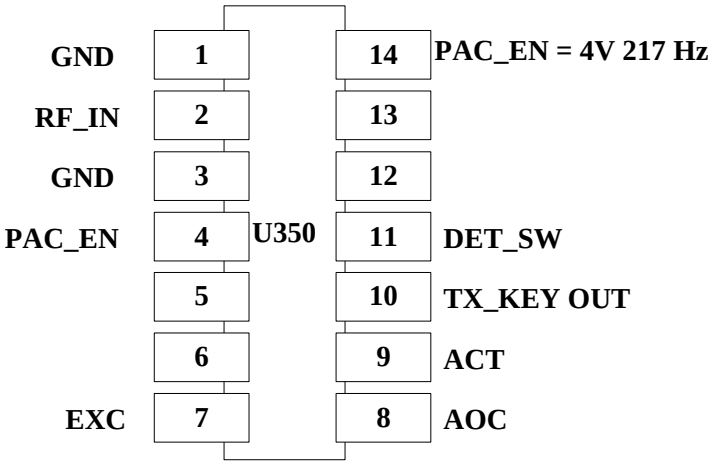
note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb

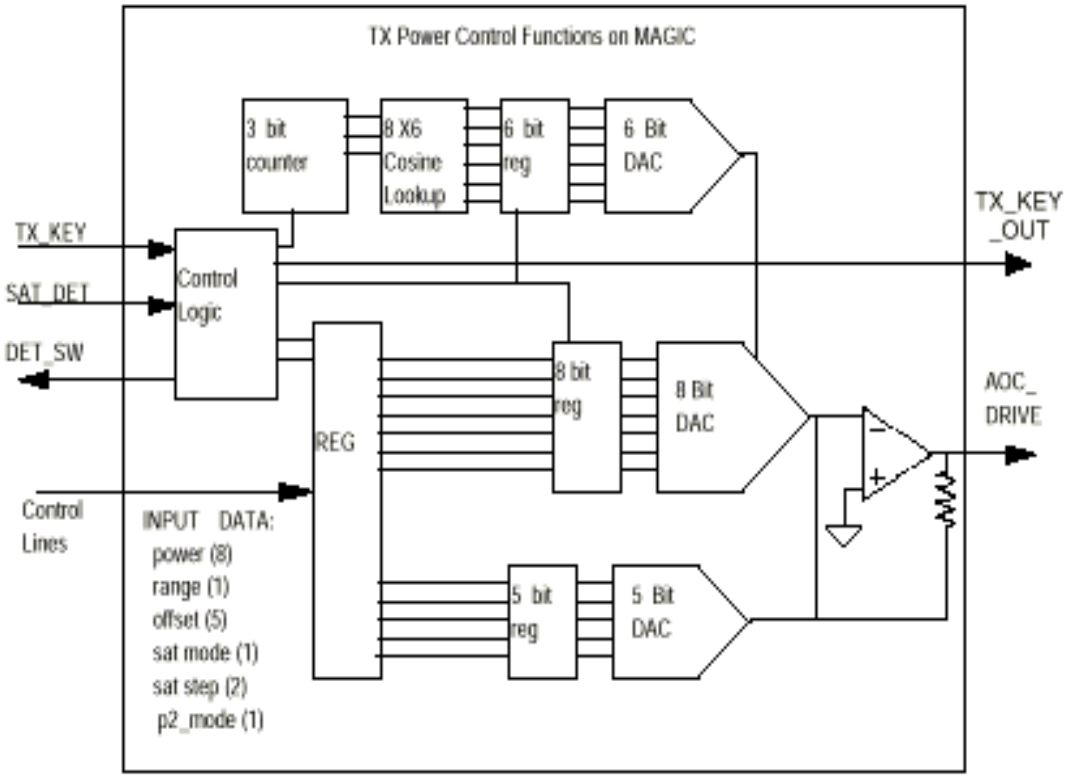
NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

NO TX GSM/DCS

pin 4,14 PAC_EN comes from Q150 via Q350 (TX_EN comes from U800)
pin 8 , 9 , 10, 11 comes from U200 if not ok check : SPI BUS on TP 205 & TP 206 for data presence with pcb in stand by.
TX KEY see on TP 209
DM_CS see on TP 208.
NOTE: REFER DIAGRAMS BELOW & on pag. 10 FOR TIMING TX.

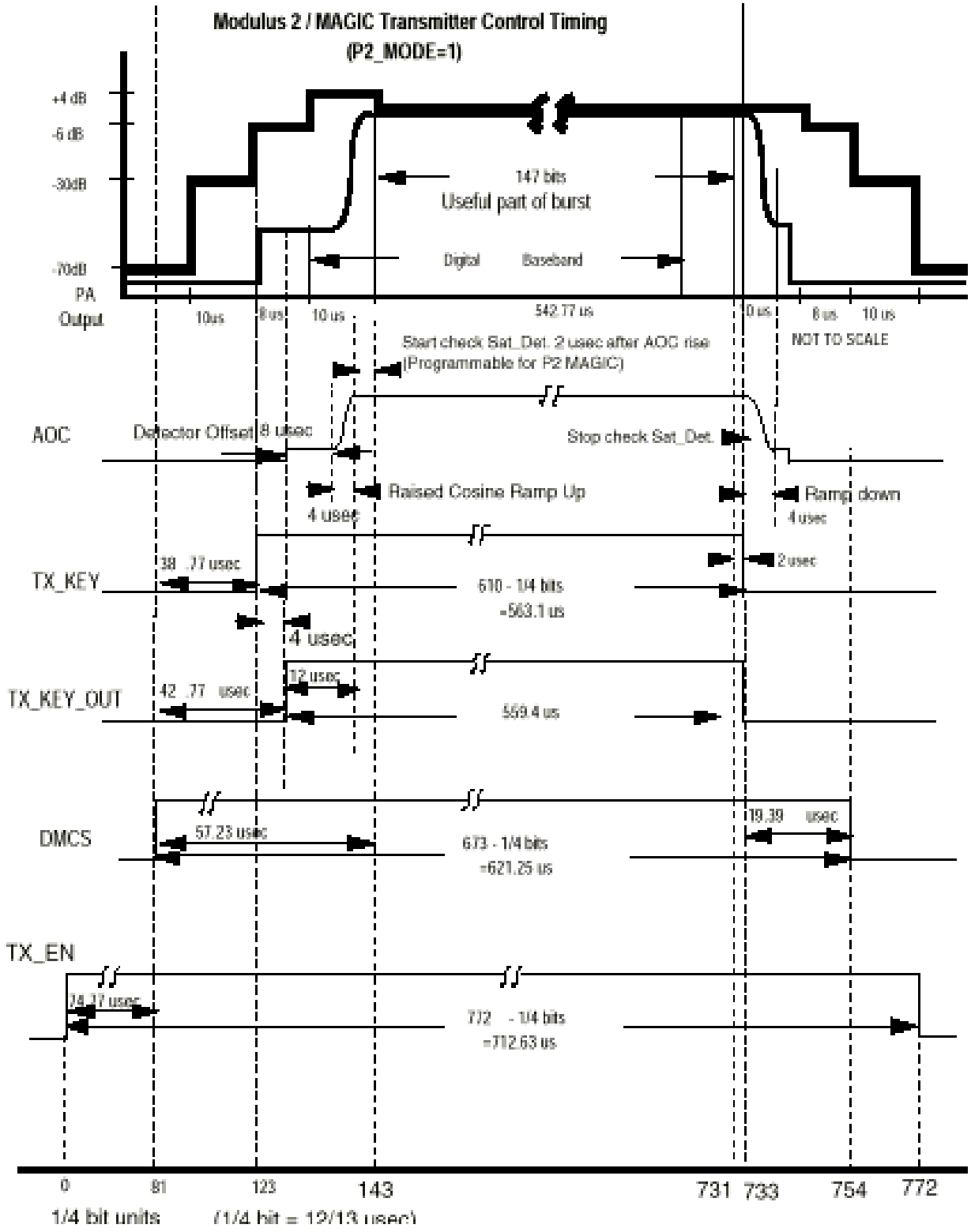
PAC IC





TX POWER CONTROL ON U200 IC

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb	NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.	NO TX GSM/DCS



MODULUS 2 TX TIMING on U200

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb

NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

CHECK CARD

Supply PCB using pcb test cable code **AE20101903**.
Set pcb in test mode and digit 38# sim test enable and check on J803 sim connector :
1= GND
2 = SIM VCC 5V SEE u900 (C906)
3 = NC
4 = RESET see CR905 , R940
5 = SIM I/O see R945 , U901 , R938.
6 = CLK see R940

YES → Probably U800 faulty

NO → Check, in order , U900 , U800 for faulty

NO DISPLAY

Replace display with a new one. Is still a display issue?

YES → Check on J902 display connector for presence of:
1 =data DP_EN it comes from U800
2= 2,7 V RESET it comes from U900
3= data A0 see R716 for missing
4= data R_W it comes from U800
from 5 to 12 = data see on C1714 to C1720
13 = 2,7 Vcc V2 it comes from C939
14 = GND
15 = -5 Vcc it comes from U903.
If all is ok probably U800 faulty.

NO → END

NO BACKLIGHT

Supply pcb using pcb test cable code **AE20101903**; is a backlight issues only in any leds?

NO → Check on Display led's anode for ALRT_VCC = 3 V presence , if not ok check Q903 and conseguently U900 for faulty.
Check also on Q907 gate for BKLT_EN = 2,7 Vcc , in this way on led's chatode there must be 1 V , if not ok check for R520 presence ,else replace Q907

YES → Replace the faulty one

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb

NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

NO KEYPAD

Remove keypad membrane and check if here is any issues (dirty , track , solder) on key contacts from S501 to S522.
Check also R500 , R501 , R502 for V2 = 2,8 Vcc presence, if all is ok probably U800 faulty.
Note : for "VOL_UP " , "VOL_DOWN" keys check also CR502 , while for "PWR_ON " key check R508 for missing or unsoldered issue ,else problem could be U900.

NO ALERT

Supply pcb using "pcb test cable" cod AE20101903 , set pcb in test mode and digit test commands 432# = tone enabled on alert way) 1513# (continuos tone),4707# max volume .
Check for "ALRT_VCC" = 3 Vcc presence on J510 alert pad and check for signal = 1,6 Vpp offset = 1,4 Vcc on J511 alert pad

YES → Check alert for faulty , else be sure you have not any intermittent problem (check U900 for this),or check for dirty on J510 , J511 alert pads.

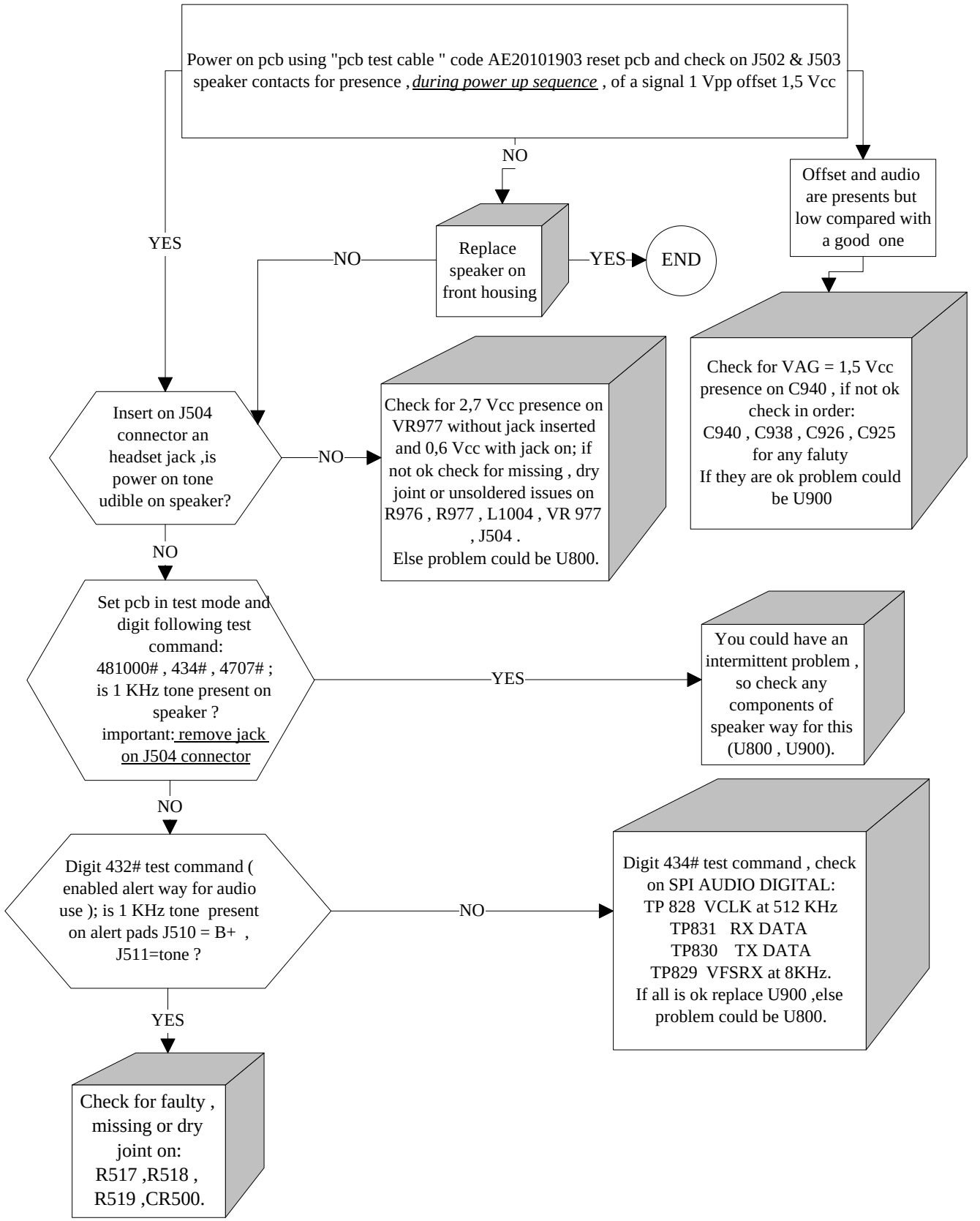
NO ↓

Check in order:
ALRT_VCC presence = 3V on Q903 pin 1 , 2 , 5 , 6 , if not ok check on pin 4 for B+ presence .Note: because Q903 is positioned under test cable you are not able to check for ALRT_VCC presence on it,so you can check this on backlight leds anode.
Check CR510 , C1723 , C1722 , C933 for missing , dry joint or faulty.
Finally, only if you have not any issue on audio speaker, problem could be U900.

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb

NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

NO AUDIO on SPEAKER


Power on pcb using "pcb test cable " code AE20101903 reset pcb and check on J502 & J503 speaker contacts for presence , during power up sequence , of a signal 1 Vpp offset 1,5 Vcc
NO
YES
Offset and audio are presents but low compared with a good one
Replace speaker on front housing
NO
YES
END
Insert on J504 connector an headset jack ,is power on tone udible on speaker?
NO
Check for 2,7 Vcc presence on VR977 without jack inserted and 0,6 Vcc with jack on; if not ok check for missing , dry joint or unsoldered issues on R976 , R977 , L1004 , VR 977 , J504 .
Else problem could be U800.
Check for VAG = 1,5 Vcc presence on C940 , if not ok check in order:
C940 , C938 , C926 , C925 for any faluty
If they are ok problem could be U900
NO
Set pcb in test mode and digit following test command:
481000# , 434# , 4707# ;
is 1 KHz tone present on speaker ?
important: remove jack on J504 connector
YES
You could have an intermittent problem , so check any components of speaker way for this (U800 , U900).
NO
Digit 432# test command (enabled alert way for audio use); is 1 KHz tone present on alert pads J510 = B+ , J511=tone ?
NO
Digit 434# test command , check on SPI AUDIO DIGITAL:
TP 828 VCLK at 512 KHz
TP831 RX DATA
TP830 TX DATA
TP829 VFSRX at 8KHz.
If all is ok replace U900 ,else problem could be U800.
YES
Check for faulty , missing or dry joint on:
R517 ,R518 , R519 ,CR500.

note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb	NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

NO AUDIO TX on microphone/headset

Supply pcb using "pcb test cable " code AE20101903 ,set pcb in test mode, digit test command:
434# audio on speaker
36# loop back on
4707# max volume
Check which way doesn' t works correctly.
Note: if each way doesn't works check on U900 for PRESENCE OF " SPI AUDIO BUS " :
Tp 828 CK 512 KHz , Tp 831 data
Tp 830 data , Tp 829 8 KHz ck.
If they are not presents check on Tp 823 or C825 for 13 MHz ck , if not ok problem could be **U800**, else **U900.**

INTERNAL MIKE DOESN'T WORK.

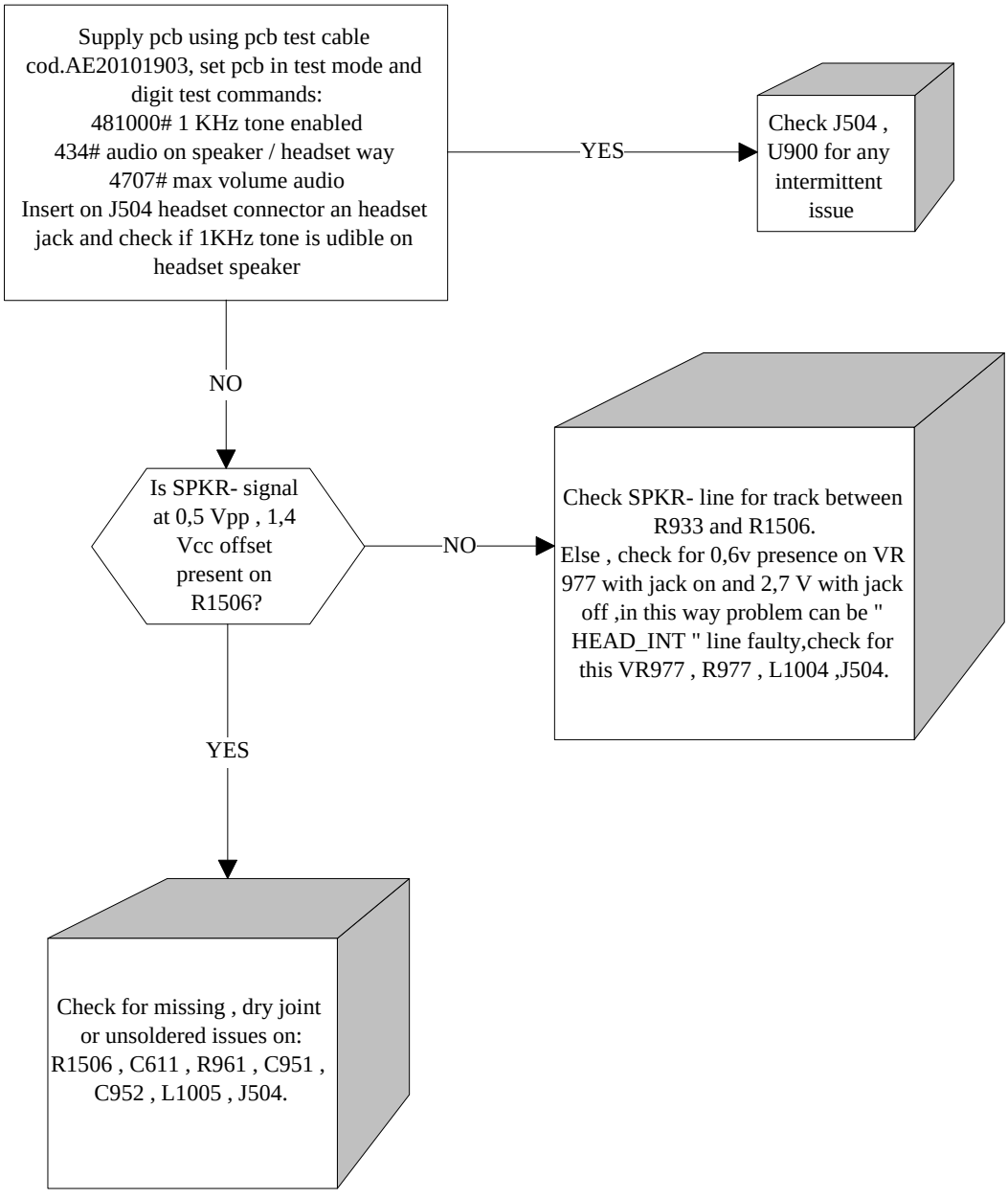
Check for "Mic bias" = 1,4 Vcc presence on C923 , if not ok check for dry joint , misssing or unsoldered issues on R927 , R926 , C934 , C927 ;if ok check for same issues on C923 , R925 , L927.
Finally problem could be U900.

HEADSET MIKE DOESN'T WORK.

Check in order:
_J504 "headset jack" for faulty or unsoldered pins.
_0,6 V presence on R977with jack on and 2,7 Vcc with itself off , if not correct check for V2 =2,7 Vcc presence on R976 , else check R976 , R977 , L1004 , VR 977 for missing , dry joint or unsoldered issues.
_L500 , C1520 , C510 , C931 , R930 , C927 , R928 , L928 for same issues.
_Mic_bias = 1 Vcc presence on C931, if not correct ,check R957 for missing ,dry joint or unsoldered issues.

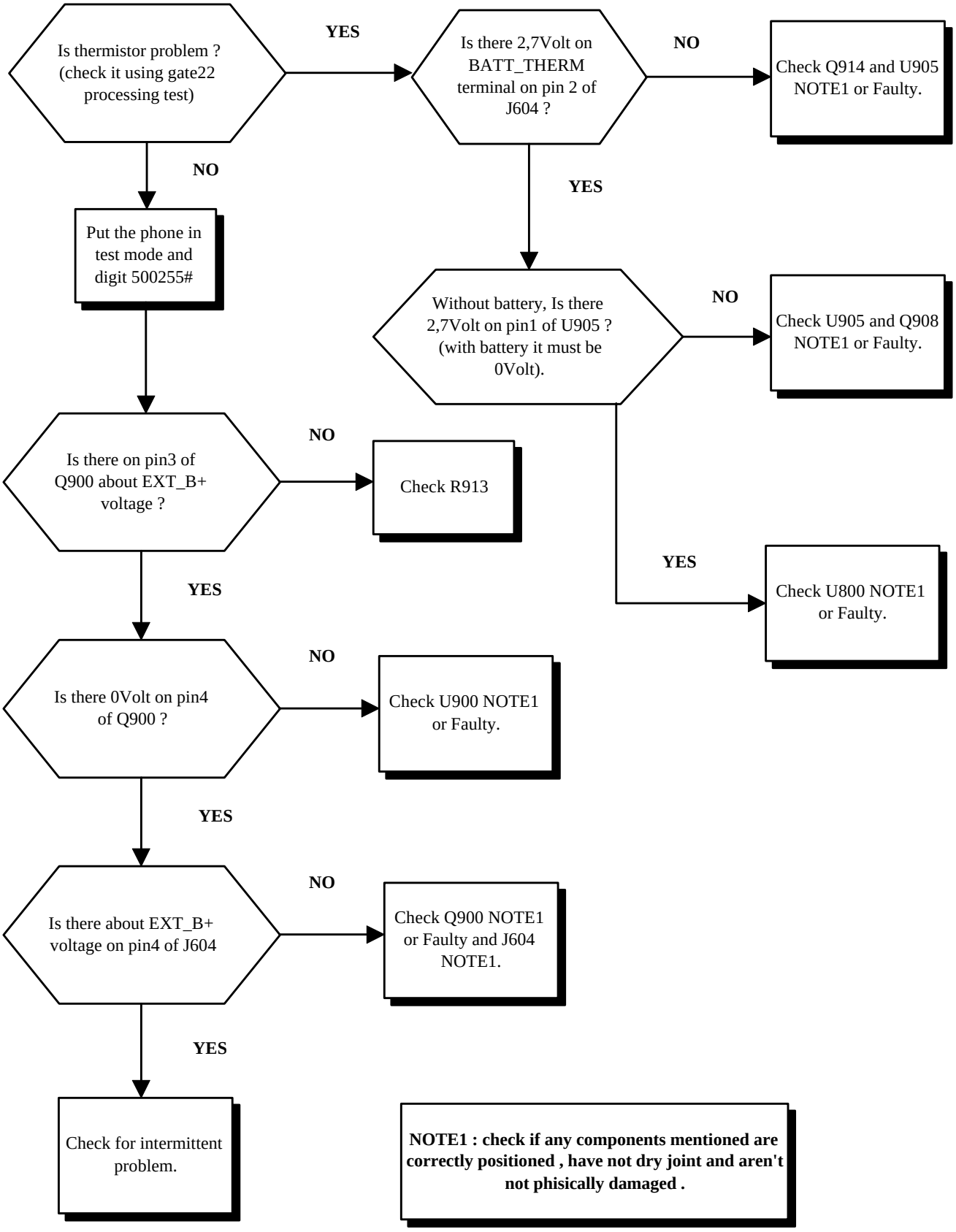
note: all the signal & voltage present in this procedure has to be clear and at correct level ; compare them with a good pcb	NOTE: check if any components mentioned is correctly positioned , has not dry joint and is not damaged . If all is ok replace it . If problem is still the same send BOARD IN htc.

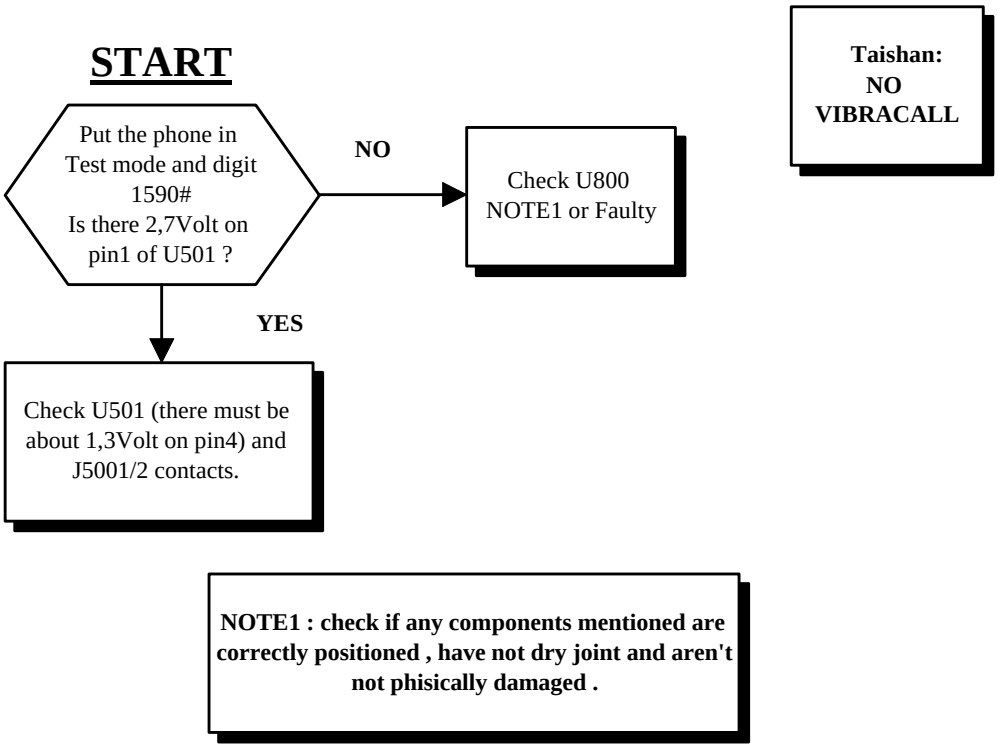
NO AUDIO RX on headset , speaker ok


Supply pcb using pcb test cable cod.AE20101903, set pcb in test mode and digit test commands:
481000# 1 KHz tone enabled
434# audio on speaker / headset way
4707# max volume audio
Insert on J504 headset connector an headset jack and check if 1KHz tone is udible on headset speaker
YES
Check J504 , U900 for any intermittent issue
NO
Is SPKR- signal at 0,5 Vpp , 1,4 Vcc offset present on R1506?
NO
Check SPKR- line for track between R933 and R1506.
Else , check for 0,6v presence on VR 977 with jack on and 2,7 V with jack off ,in this way problem can be " HEAD_INT " line faulty,check for this VR977 , R977 , L1004 ,J504.
YES
Check for missing , dry joint or unsoldered issues on: R1506 , C611 , R961 , C951 , C952 , L1005 , J504.

Taishan: NO CHARGER

START

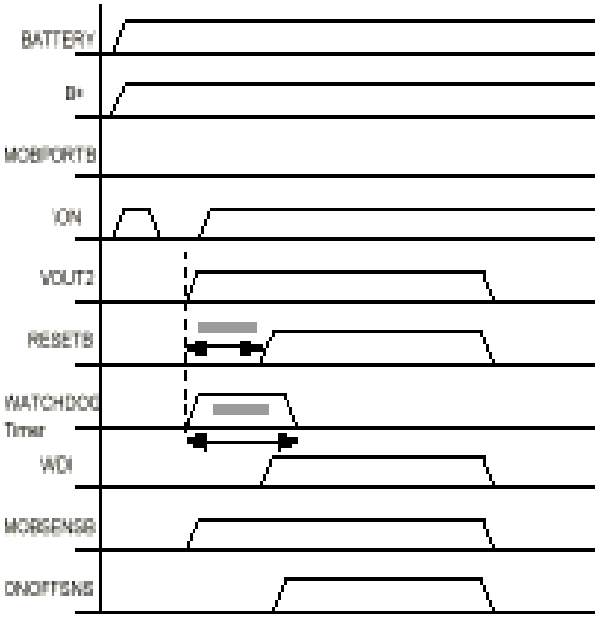

Is thermistor problem ? (check it using gate22 processing test)
YES
Is there 2,7Volt on BATT_THERM terminal on pin 2 of J604 ?
NO
Check Q914 and U905 NOTE1 or Faulty.
NO
Put the phone in test mode and digit 500255#
YES
Without battery, Is there 2,7Volt on pin1 of U905 ? (with battery it must be 0Volt).
NO
Check U905 and Q908 NOTE1 or Faulty.
Is there on pin3 of Q900 about EXT_B+ voltage ?
NO
Check R913
YES
YES
Check U800 NOTE1 or Faulty.
Is there 0Volt on pin4 of Q900 ?
NO
Check U900 NOTE1 or Faulty.
YES
Is there about EXT_B+ voltage on pin4 of J604
NO
Check Q900 NOTE1 or Faulty and J604 NOTE1.
YES
Check for intermittent problem.
NOTE1 : check if any components mentioned are correctly positioned , have not dry joint and aren't not phisically damaged .


START
Put the phone in Test mode and digit 1590# Is there 2,7Volt on pin1 of U501 ?
NO
Check U800 NOTE1 or Faulty
YES
Check U501 (there must be about 1,3Volt on pin4) and J5001/2 contacts.
Taishan: NO VIBRACALL
NOTE1 : check if any components mentioned are correctly positioned , have not dry joint and aren't not phisically damaged .

See timing sequence below for no power up issues on pag.03

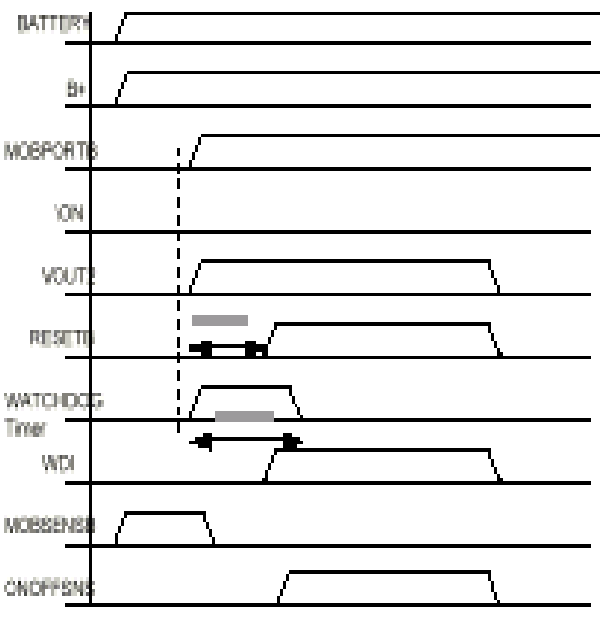
NO POWER UP TIMING SEQUENCE

a) Radio turned on from ON/OFF



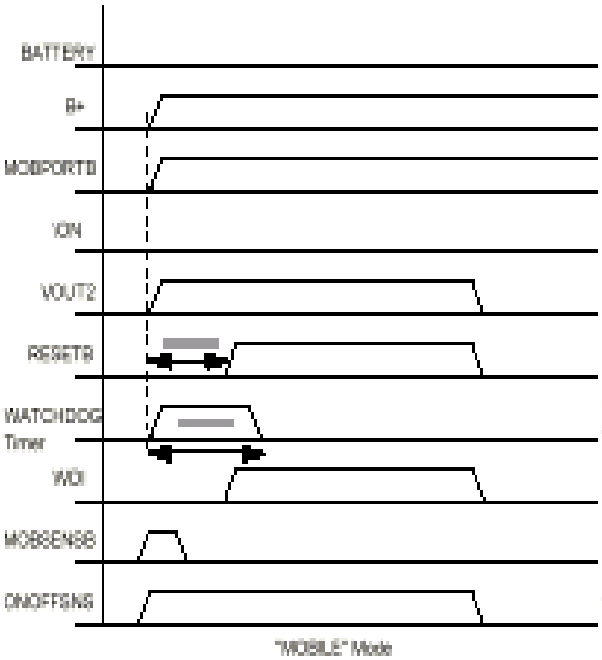
PORTABLE Mode

b) Radio on via transition to MOBILE



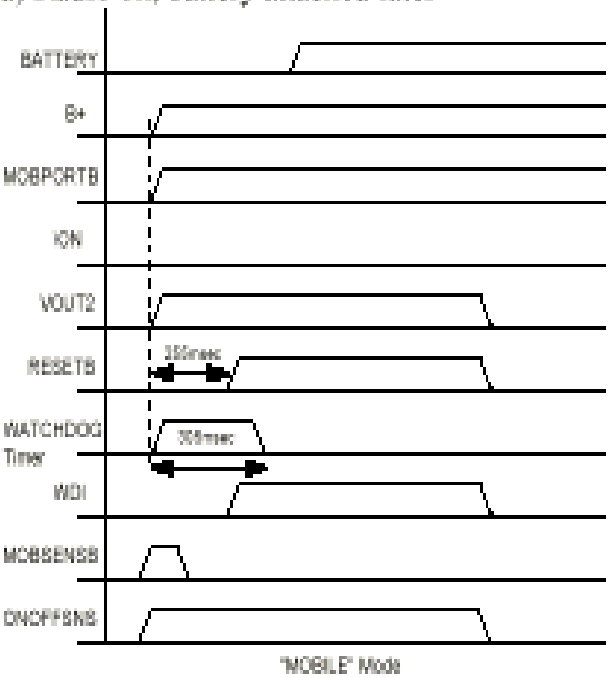
PORTABLE Mode changing to MOBILE

c) Radio on, no battery



"MOBILE" Mode

d) Radio on, battery attached later



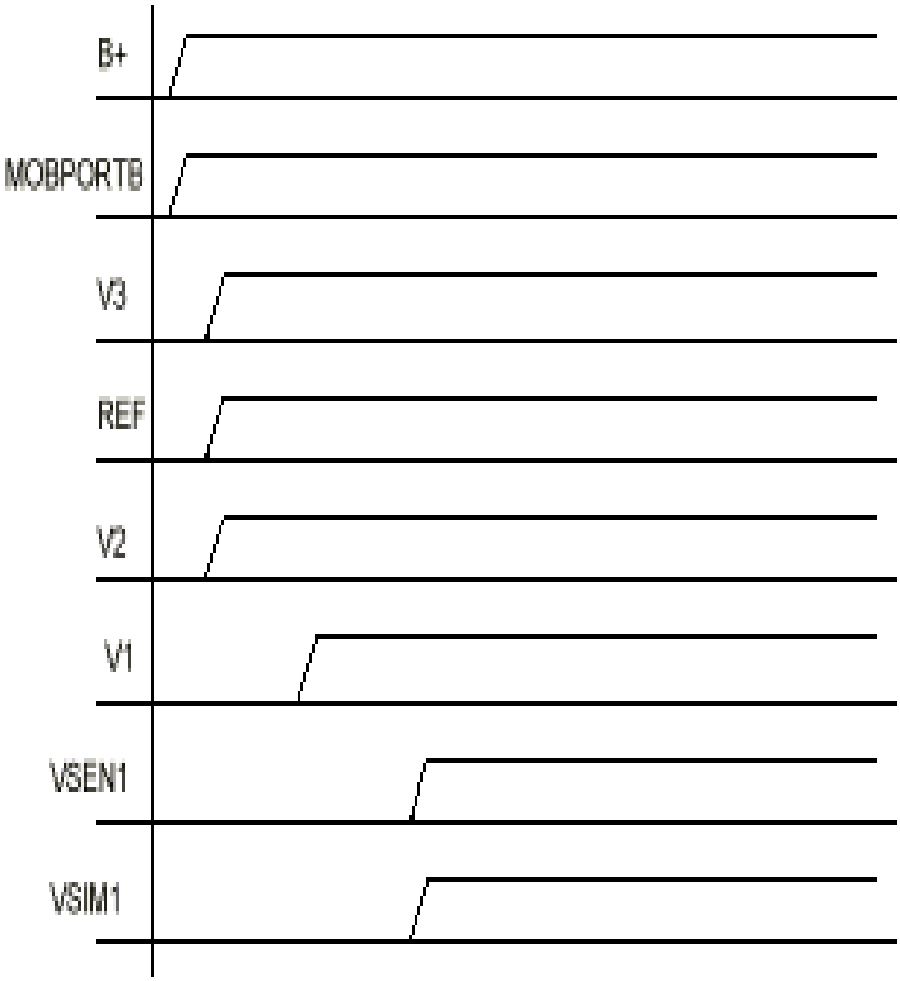
"MOBILE" Mode

See timing sequence below for no power up issues on pag.03

NO POWER UP TIMING SEQUENCE

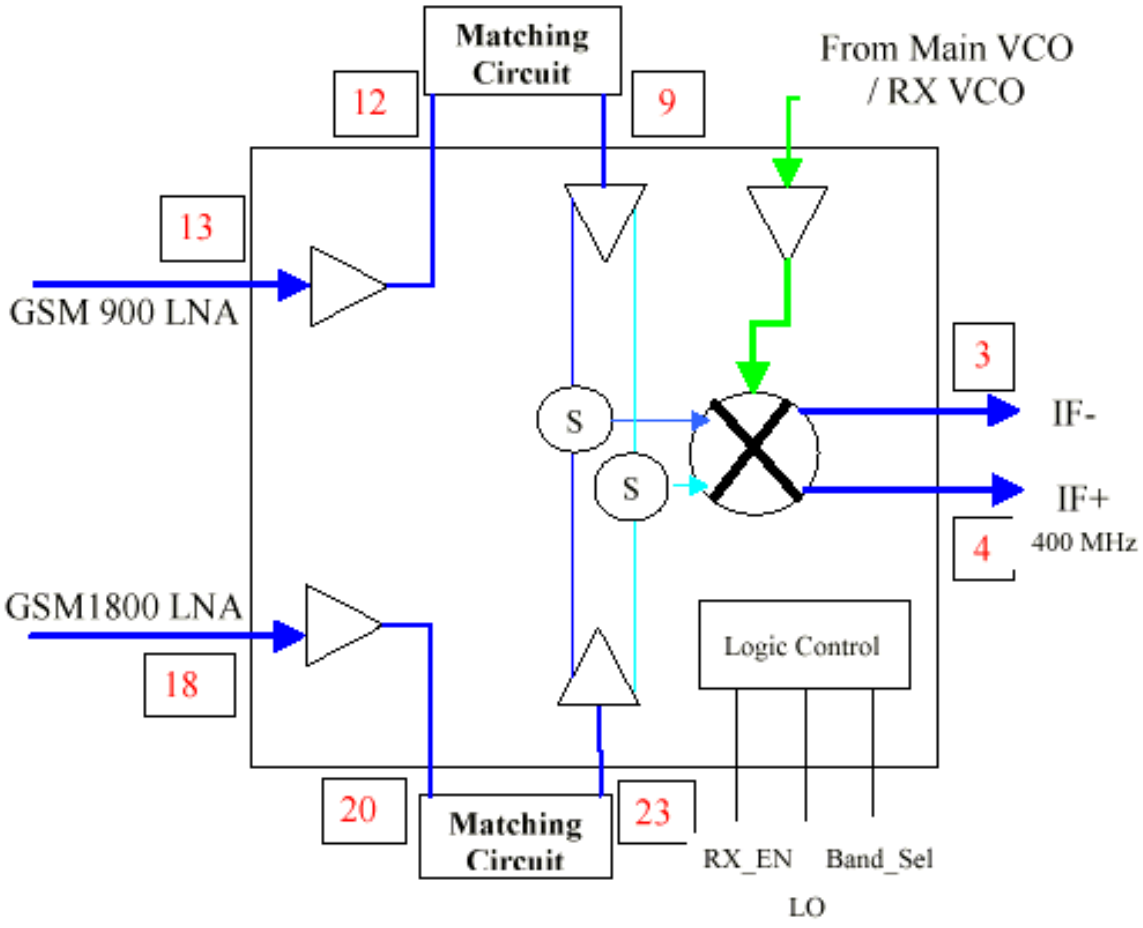
Regulator Power Up Sequence

No particular delay timing is established for any critical radio turn on sequence.

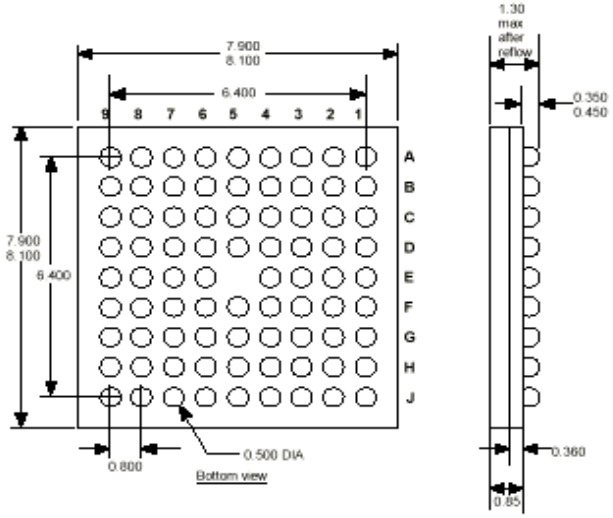


U432 (front end+mixer)

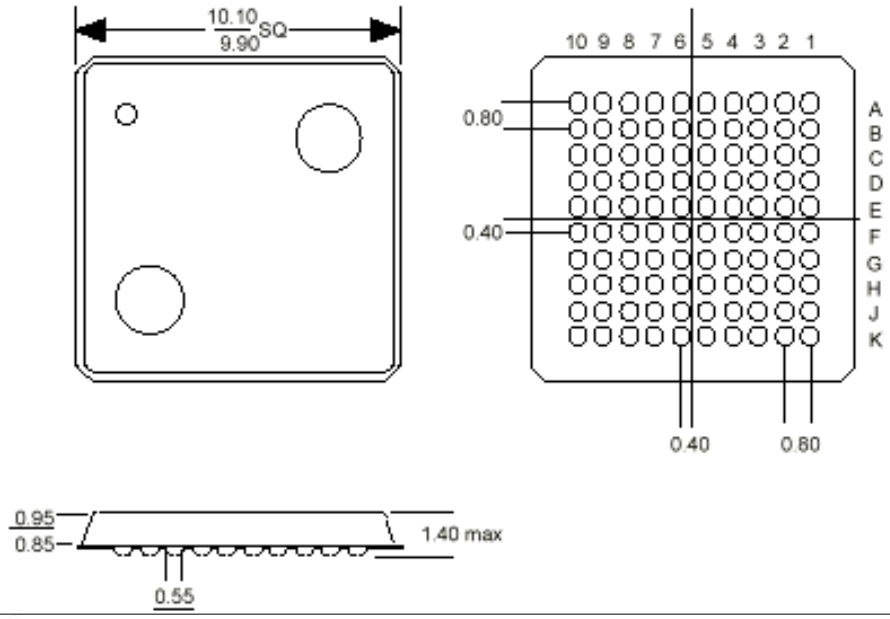
Front End IC Internal Operation



MAGIC IC U200 PACKAGE

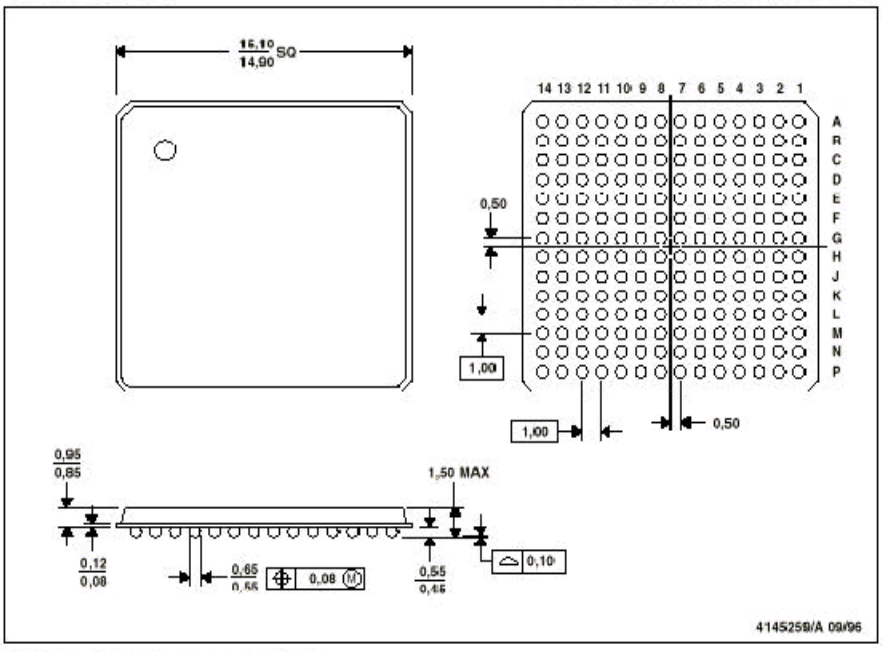


GCAP 2 IC U900 PACKAGE



WHITECAP IC U800 PACKAGE

GHC (S-PBGA-N196) PLASTIC BALL GRID ARRAY PACKAGE



NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. MicroStar™ BGA configuration

GSM Service Support Level 3 Authorized

Dual Band Taishan

RX MID CHANNELS
GSM: CH 62 -- 947,4 MHz
EGSM: CH 37 -- 942,4Mhz
DCS: CH 700 -- 1842,8MHz

A100

-5V

RX_EN
TX_EN
Q110
VB
VA

J300
U100
VA
VB

FL470
900-1900MHz

GSM
FL480
925-960MHz
1805-1880MHz
FL472
DCS

RF_V2
RVCO_250
2,5,6
10
U432
FRONTEND IC
16
24
RX_EN
DCS_SEL

400 MHz
FL490

RX
LOCAL
OSCILLATOR
Osc.
discrete
circuty
Q203
800MHz
CR249
RF_V1

U913
MAGIC
A9
PLL
C8
B
Q490
C
SW_VCC
A7
STEP
ATT.
DEMODULATION
RXI
RXQ
RX
SPI
F7
G9
G8
(SCLK_OUT) BCLKR
(SDFS) BFSR
(SDRX) BDR
to WhiteCap

C7
C6
SWITCH
RF_V1
Q201
B+
Q202
RF_V2
H2
H1
F1
REG.
G1
VRef
PHASE
DET
Divider
200KHz
13MHz
J7
J9
CR248

D1, D8, F2
SWITCH
SUPER
FILTER
MUX
J6
H6
MAGIC_13MHz
CLK_SELCT
to WhiteCap
from WhiteCap
Startup
Ref.
1 /2

SF_OUT
C1
A1
B1
A3
PHASE
DET
Divider
PLL
AFC
Prog.
Divider
200KHz
REF.
REF. OSC.
26 MHz
E2
26MHz
Y200

V1_SW
A8
GP04
F9
GP02
C4
LOGIC
CONTROL
SPI
INTER
FACE
G5
H4
J3
(CE) MQSPI_CS1
(SPI_CLK) MOSPI_CLK1
(SPI_DATA) DX1
from WhiteCap

MODULATION
TXI
TXQ
TX
SPI
J2
G7
(SDTX) BDX
(TX_CLK) BCLKX

DCS_SEL
A5
B6
B4
C5
PA
CONTROL
LOGIC
CONTROL
H8
J4
H5
RX_ACQ
DM_CS
TX_KEY
from WhiteCap

TX FRQ. RANGE
EGSM: 880-915Mhz
DCS: 1710-1785MHz

B+
Q333
TX_EN
REG_B+
B+
Q370
Q331
Q330
CR320
RF_V2
Q320

RX VCO MID CHANNELS
GSM: CH 62 -- 1347,4 MHz
EGSM: CH 37 -- 1342,4Mhz
DCS: CH 700 -- 1442,8MHz

RX VCO FRQ. RANGE
EGSM: 1325 - 1360Mhz
DCS: 1405 - 1480MHz

RX_DCS_*GSM
U253
RX VCO
RVCO_250
Q172

U350 PAC
DET
SAT.
RF_IN
PAC_EN
4, 14
1, 3

TX VCO FRQ. RANGE
EGSM: 880-915Mhz
DCS: 1710-1785MHz

TX VCO MID CHANNELS
GSM: CH 62 -- 902,4MHz
EGSM: CH 37 -- 897,4MHz
DCS: CH 700 -- 1747,8MHz

U301
TX VCO
TX LOOP
FILTER
SF_OUT
GSM_TX_VCO
DCS_TX_VCO

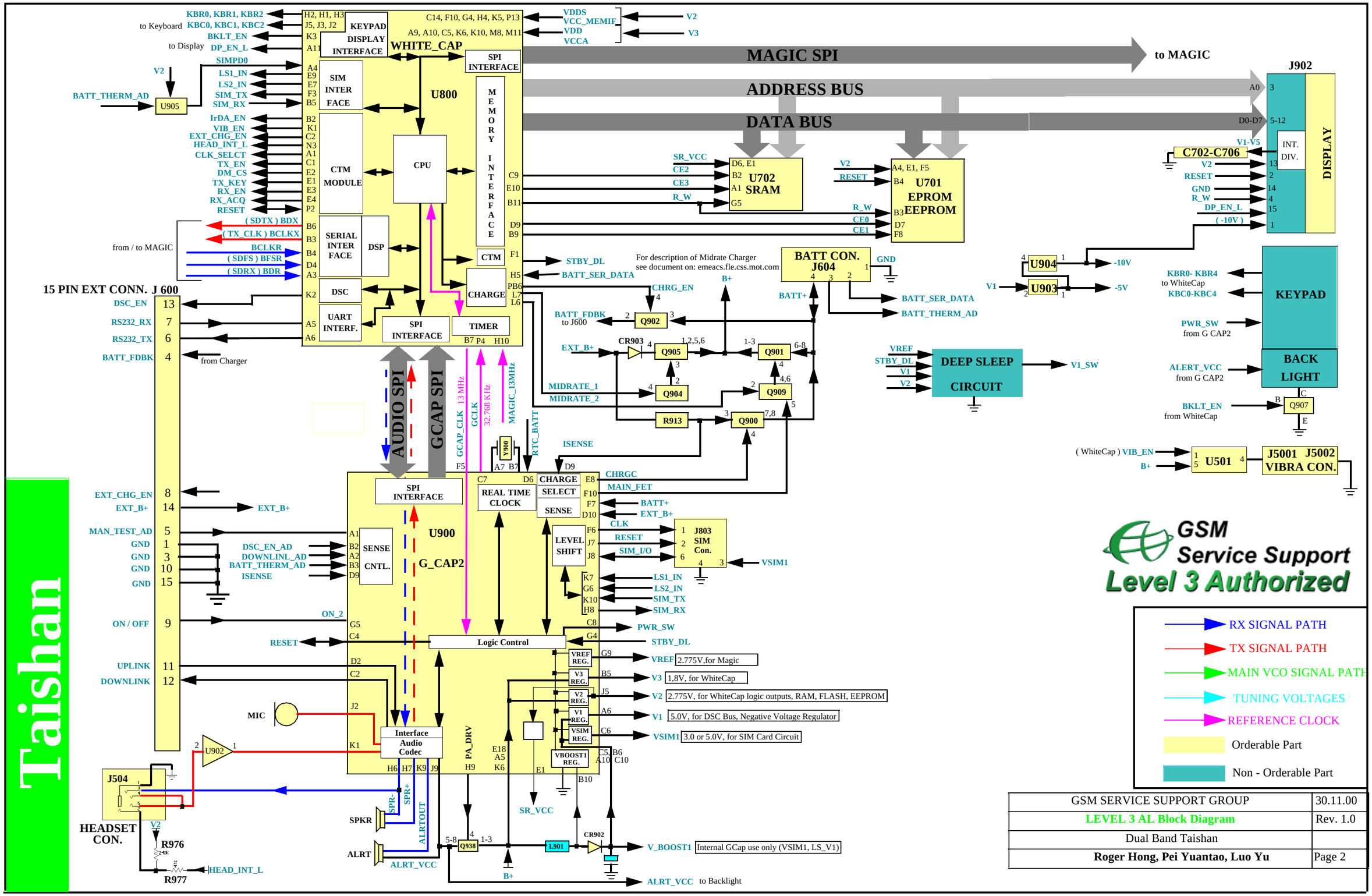
DET_SW
AOC_DRIVE
SAT_DETECT
TX_KEY_OUT
DETECT_SW
AOC_DRIVE
SAT_DETECT
TX_KEY_OUT

GSM_TX_VCO
DCS_TX_VCO
RX_DCS_*GSM
-5V
PAC_EN
GSM / DCS SELECT CIRCUIT
DCS_SEL

GSM SERVICE SUPPORT GROUP	30.11.00
LEVEL 3 RF Block Diagram	Rev. 1.0
Dualband Taishan	
Roger Hong, Pei Yuantao, Luo Yu	Page1

RX SIGNAL PATH
TX SIGNAL PATH
MAIN VCO SIGNAL PATH
TUNING VOLTAGES
REFERENCE CLOCK
Orderable Part
Non - Orderable Part

Taishan

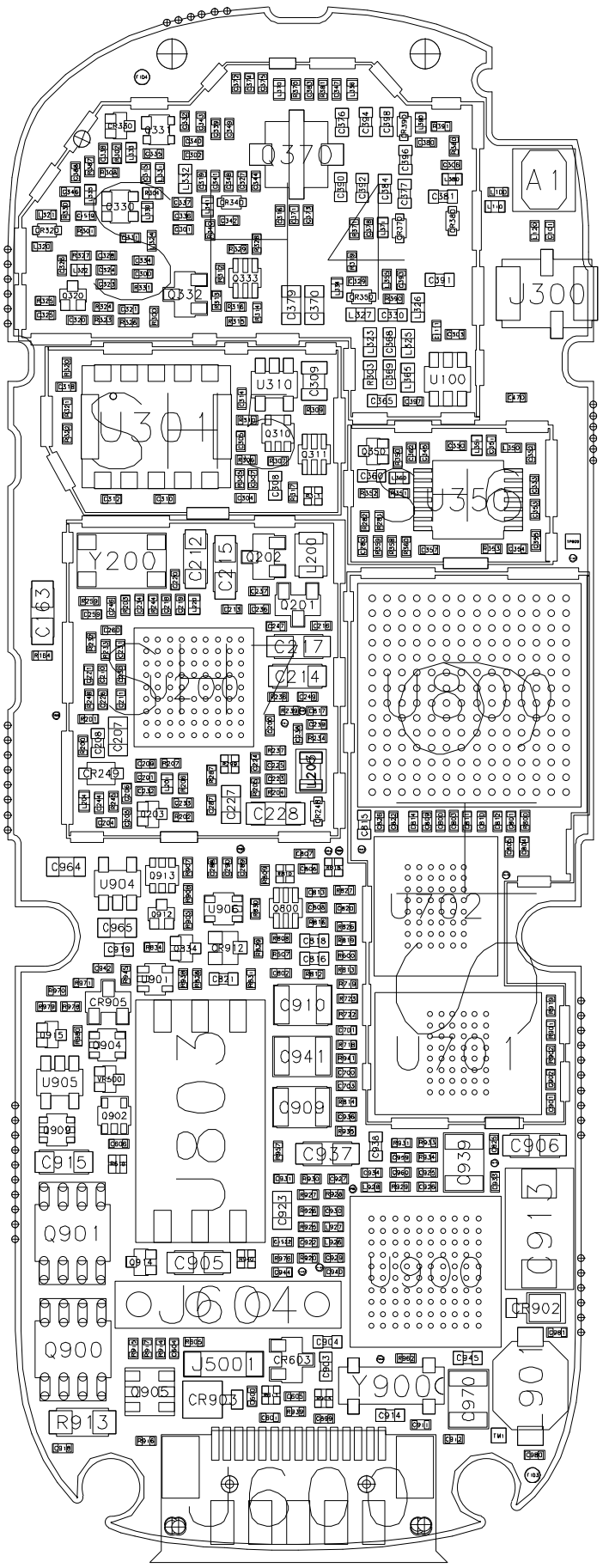


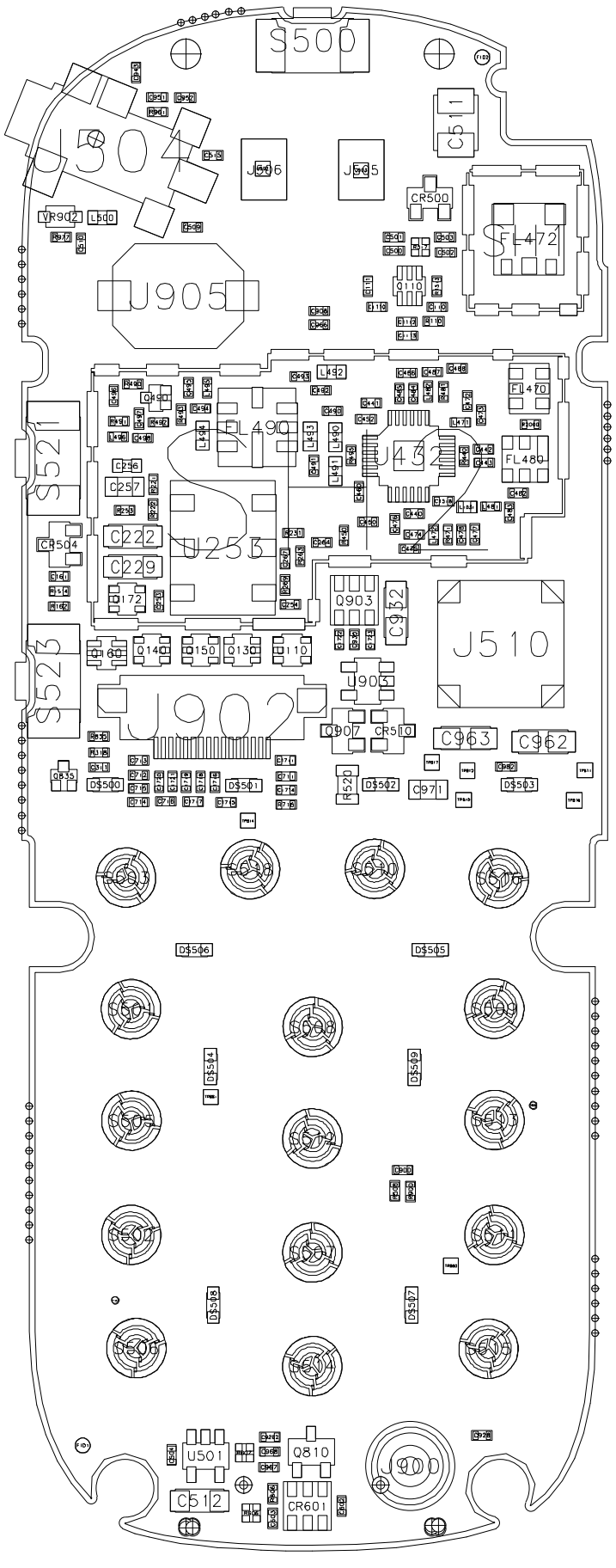
GSM Service Support
Level 3 Authorized

RX SIGNAL PATH
TX SIGNAL PATH
MAIN VCO SIGNAL PATH
TUNING VOLTAGES
REFERENCE CLOCK
Orderable Part
Non - Orderable Part

GSM SERVICE SUPPORT GROUP	30.11.00
LEVEL 3 AL Block Diagram	Rev. 1.0
Dual Band Taishan	
Roger Hong, Pei Yuantao, Luo Yu	Page 2

Taishan Board Layout
Draft 2000-12-12





GSM Service Support
Level 3 Authorized

Dual Band Taishan

GSM SERVICE SUPPORT	2001.01.15
Level 3 Schematics	Rev 1.0
Dual Band Taishan	8464/37E01_ Rev 1.0
Michael Hansen, Ralf Lorenzen-Schnell, Ray Collins	Page 1